



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

NYPL RESEARCH LIBRARIES



3 3433 08990823 4

Automobile

3-10-11

AUTOMOBILE JOURNAL

\$1.50 the year
10 cents the copy

PAWTUCKET R.I.

February 10, 1915

REDUCE CARBON

647335 The Scientific Method

IF you are an experienced automobilist you know there is no such thing as a non-carbon oil. You know that you must expect *some* carbon deposit. But you *should* and *can* reduce or avoid its troublesome effect.

The method is simple.

First see that your gasoline is of good quality and that your carburetor is correctly adjusted to avoid carbon from incomplete combustion of the fuel charge.

Then use an oil properly purified to remove free carbon—an oil *whose body suits your motor*.

If the *body* of the oil is wrong for the piston clearance in your motor, excess oil may work into the combustion chambers. There it burns. Carbon results. Eventually, troublesome carbon deposit accumulates.

In our complete Chart of Automobile Recommendations you will find specified the correct grade of Gargoyle Mobiloils for your car. This oil has

been thoroughly purified to remove free carbon. The *body* of the grade specified is correct for the piston clearance in your motor.

With good quality gasoline and a correctly adjusted carburetor this oil will eliminate troublesome carbon deposit.

If you use an oil which is incorrect for your car, you *must* expect unnecessary carbon troubles. And no one can determine the correct oil by guess-work.

For several years our Chart has been the automobilist's standard guide to correct lubrication. It is based on a thorough engineering analysis of the motor construction of each car named. On request we will send this chart, which lists the correct grade of oil for every make of car.

It is safest to buy Gargoyle Mobiloils in original barrels, half-barrels and sealed five and one-gallon cans. See that the red Gargoyle, our mark of manufacture, is on the container.



Mobiloils

A grade for each type of motor

Gargoyle Mobiloils can be secured from reliable garages, automobile supply houses, hardware stores, and others who supply lubricants.

For information, kindly address any inquiry to our nearest office. The city and state address will be sufficient.

VACUUM OIL COMPANY, Rochester, N. Y., U. S. A.

Specialists in the manufacture of high-grade lubricants for every class of machinery. Obtainable everywhere in the world.

DOMESTIC BRANCHES:

DETROIT FORD BLDG. 49 FEDERAL ST. BOSTON NEW YORK 61 BROADWAY CHICAGO FISHER BUILDING PHILADELPHIA 4TH & CHESTNUT STS. INDIANAPOLIS INDIANA PYTHIAN BLDG. MINNEAPOLIS PLYMOUTH BLDG. PITTSBURGH FULTON BLDG.

The Miller Dreibund (*Triple Alliance*)

insures every Miller dealer a permanent,
growing business and the most profit

THE dealer having the *exclusive sale* of a tire that gives the user the utmost in mileage, service and satisfaction, is the dealer who makes the most profit, *provided* the tire he sells is nationally advertised and therefore easy to sell.

The Miller Dreibund *Triple Alliance* has taken dealers everywhere out of the "tire handling" class and put them into the "profit selling" class. It has put them on the map.

You, too, can put yourself on the map with

Miller GEARED TO THE ROAD Tires

The Miller Method of building tires is the net result of 23 years of rubber experience. The Miller Method doesn't cook the life out of the rubber in vulcanizing, but preserves all of the rubber's native toughness. This means life in the tire and maximum strength for wear on the car.

The Miller Plan of selling tires (*one dealer in a town*) gives one dealer all the profit, not a slice of it. The Miller dealer owns his own tire trade, and gets all the profit from every Miller tire sold in his territory.

No tire dealer could afford to buy a page in the Saturday Evening Post, Collier's Weekly or the publications used to advertise Miller tires. But each Miller dealer gets the same effect, because the motorist in your town reading these advertisements, can buy Miller tires *only* from him. All the force back of this big magazine campaign works for you—it's not split up among a lot of dealers who sell a number of different makes of tires. The Miller dealer gets all the sales and all the profits.

The Miller tire is the best tire for you, Mr. Dealer, to sell, because it's easily sold, stays sold, makes permanent, satisfied customers and gives you the most profit.

Think over what the exclusive agency of a quality tire like the Miller backed by national advertising means to you. If you are the best tire dealer in your town, write at once and get the details of the Miller plan before some other dealer gets the Miller agency in your town.

The Miller Rubber Co., Akron, O.



SEE THE NEW-SIZE \$2285

WINTON SIX



Your Own Personal Car

Automobile buyers have long complained that they could not obtain genuine quality in any but the biggest and costliest cars. When they wanted cars of medium size, they were forced to accept medium quality. So we have brought out the high-grade New-Size Winton Six, with 3 5-8 by 5 1-4 six-cylinder motor and 128 inch wheel base.

This car fills a place never before occupied. Supplies a want never before satisfied. Highest of quality in every feature, and at a price hitherto impossible—\$2285. And, best of all, we finish your personal car in a color scheme of your own selection, making it distinctly *your own* personal possession, not merely an anonymous vehicle.

Write today for complete catalog.

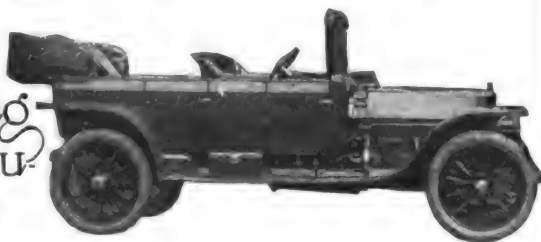
THE WINTON MOTOR CAR CO.

131 BERA ROAD,

CLEVELAND, OHIO

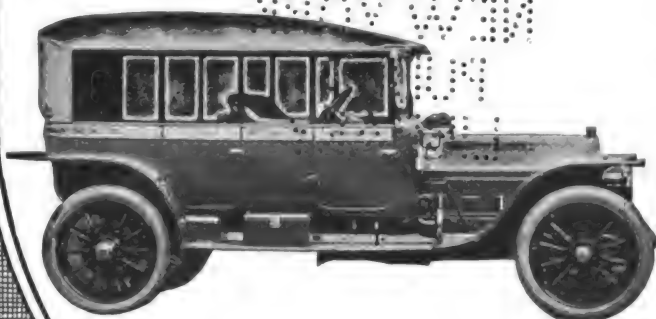
When Writing to Advertisers, Please Mention The Automobile Journal.

The comfort of every car combined. An instantaneously convertible equipment that affords a touring body or a limousine whenever desired.



Changes can be made on the road as readily as in the garage. No matter what the occasion or requirement, your car with the

SPRINGFIELD CONVERTIBLE BODY is always ready and always has



the accommodation and protection you desire.

Can be raised or lowered

as easily as folding top.

SPRINGFIELD METAL BODY CO.

SPRINGFIELD

MASS.

When Writing to Advertisers, Please Mention The Automobile Journal.



BOSCH Magnetos

are made as well as expert workmen with the best of machines and best of raw materials can make. Because of this the Bosch Magneto is known as the most desirable ignition system.

By reason of its quality the Bosch Magneto may cost a trifle more than other ignition systems—but, considering its ability to serve long and well and to give efficient service irrespective of the knowledge or attention of the user, it is comparatively the cheapest ignition system made.

No car is too low priced to satisfy—to satisfy it must be Bosch-Equipt

Correspondence Invited

BOSCH MAGNETO CO., 204 West 46th Street, New York

Chicago—Detroit

Over 250 Service Stations

San Francisco—Toronto

When Writing to Advertisers, Please Mention The Automobile Journal.



Wrenches Are Made Right, Stay Right,
Last a Lifetime, and are 30% Stronger
Than Any Other.

"COES" on any Wrench Means Quality,
Best Material and Finest Workmanship.
An Inspected and Tested Wrench. The
Ironclad "COES" Guarantee for Strength
and Finish.

The "COES" Automobile Model are for Motorists
and Repairmen. For Service Specify "COES" No
Tool Kit or Repairshop is Complete Without One.

Ease of Handling Without Fear of Slipping or Bruis-
ing. Perfect Balance and Certain Grip has made the
"COES" the Most Widely Used Tool of the Kind in
the World.

COES WRENCH CO.

WORCESTER MASS.

J.C. McCARTY & CO.
JOHN H. GRAHAM & CO.

29 Murray St. New York City
113 Chambers St. New York City

When Writing to Advertisers, Please Mention The Automobile Journal.



For Overland Dealers Only

In February we start an entirely new advertising campaign.

Every month we shall use a two-page double spread in four colors in

The Ladies' Home Journal

This paper is one of the most influential publications in the world.

It reaches 1,750,000 substantial homes every month.

No other automobile manufacturer gives its dealers such liberal and such beneficial cooperation.

Watch this space for other important announcements.



Handsome catalogue on request. Please address Dept. 52,

The Willys-Overland Company, Toledo, Ohio

What is "Half Spacing"?



Ball Bearing: Long Wearing

"Half-spacing", one of the many valuable features of the L. C. Smith & Bros. Typewriter, allows the operator to fill in an omitted letter where there is no additional space.

Suppose she has written, "Your valued order hs been filled." Half-spacing enables her to write "has" correctly and not run it into the other words.

It also comes in handy where the operator forgets to space between words. She can "half-space", rewrite one of the words, and you couldn't tell the difference.

TRY IT ON ANY OTHER TYPEWRITER.
Then call up any of our Branches and ask for a demonstration.

L. C. SMITH & BROS. TYPEWRITER COMPANY

Home Office and Factory, SYRACUSE, N. Y.

Branches in All Principal Cities

When Writing to Advertisers, Please Mention The Automobile Journal.

NEW DEPARTURE BALL BEARINGS

American Made for American Trade



BUILT of the best materials that the world affords, under methods and processes advanced to the highest degree of precision.

No consideration of the cost of production is permitted to interfere with making perfect every component part of each of the four types of New Departures, whether pertaining to design, workmanship, finish or inspection.

It has been conclusively demonstrated that New Departure Ball Bearings, each according to its purpose and capacity, will yield the highest possible satisfaction in anti-friction bearing service.

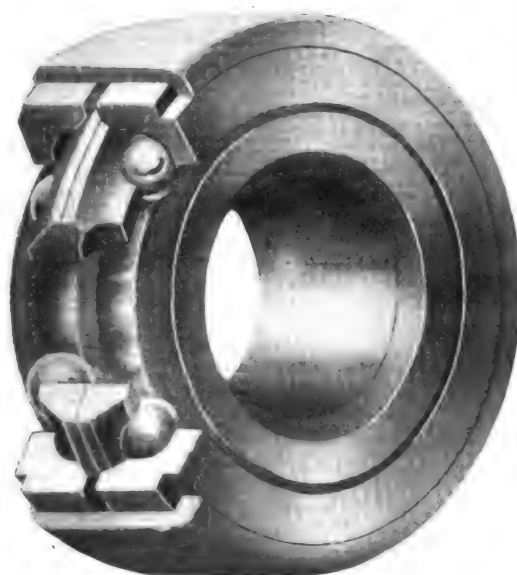
Write for Catalog

The New Departure Mfg. Co.

Bristol, Conn., U. S. A.

Distributors in Trade Centers Throughout the United States.

Western Branch: 1016-17 Ford Building, Detroit, Mich.



When Writing to Advertisers, Please Mention The Automobile Journal.

Index to Advertisers.

Page	Page
Ahlberg Bearing Co.....73	Times Square Automobile Co.. 8
Alsten & Goulding Co.....73	Tuller Hotel.....80
Barrett Manufacturing Co.....73	Vacuum Oil Co.....Cover
Bosch Magneto Co.....73	Valvoline Oil Company.....73
Boston Auto Show.....Cover	Vanderpool Co.....8
Boyd, F. Shirley.....76	Weed Chain Tire Grip Co....74
Braender Rubber & Tire Co..76	Willys-Overland Co.....5
Broadway Central Hotel.....80	Winton Motor Car Co.....1
Cartercar Company.....74	Zenith Carburetor Co.....73
Coes Wrench Company.....4	
Continental Asbestos Corp....79	
Culver-Stearns Mfg. Co.....77	
Dixon Crucible Co., Jos.....76	
Dover Stamping & Mfg. Co..76	
Eagle Oil & Supply Co.....8	
Eisemann Magneto Co., The..73	
Findelson & Kropf Mfg. Co..14	
Garford Mfg. Co.....79	
Geisler Bros. Storage Bat. Co..76	
Goodyear Tire & Rubber Co. ....Cover	
Harris Oil Co., A. W.....79	
Heinze Electric Co., The.....77	
Hotel Broadway Central.....80	
Hotel Tuller.....80	
Inter-State Motor Co.....75	
Marburg Bros.....76	
McQuay-Norris Mfg. Co.....79	
Mea Magneto.....76	
Metz Company.....74	
Miller Rubber Co.....Cover	
Milwaukee Auto Specialty Co..75	
Motor Parts Co.....78	
New Departure Mfg. Co.....7	
Nordyke & Marmon Co.....73	
N. Y. & N. J. Lubricant Co....75	
Paige-Detroit Motor Car Co..73	
Peerless Motor Car Co.....78	
Pyrene Co. of N. E.....76	
Reo Motor Car Co.....78	
Royal Equipment Co.....77	
Russell Mfg. Co.....78	
Sager Company, J. H.....75	
Salvador Motor Co., The.....78	
Scripps-Booth Co.....79	
Silvex Co.....77	
Smith & Bros. Typewriter Co., L. C.....6	
Splittorf Electrical Co.....13	
Springfield Metal Body Co....2	
Standard Oil Co.....76	
Staybestos Mfg. Co.....74	
Studebaker Corp.....75	
Stutz Motor Car Co.....11	
Superior Mfg. Co.....77	

FOR SALE.

**Shop Vulcanizer, Bargain.
Vanderpool, Springfield, O.**

We sell everything pertaining to the automobile at half regular prices. Send for our great "PRICE WRECKER" No. 5, containing 3000 auto bargains at cut prices. **TIMES SQUARE AUTOMOBILE Co.** World's largest dealers. S. W. Cor. 56th St. and Broadway, N. Y. 1210 Michigan Avenue, Chicago.

Accessory and Garage Journal

Only Trade Readers

20,000 Copies

**EACH MONTH
GUARANTEED**

Unequalled in Its Field

Write for Proof and Rates

**IMITATED
BUT NOT
DUPLICATED**

**N
O
K
A
R
B
O
N

E
A
G
L
E

A
U
T
O
O
I
L**

**THE OIL THAT SUITS
AND DOES NOT SOOT.**

Carbon in your cylinders means loss of power. Customers report 10,000 to 15,000 miles with no carbon troubles. A good motto: TRY ANYTHING ONCE. **EAGLEINE NO-KARBON AUTO OIL** is furnished in 1-5-10 gallon, 30 and 50 gallon Steel Drums with faucets for which no extra charge is made.

**EAGLE OIL
AND SUPPLY CO.**

104 BROAD STREET, BOSTON, MASS.



Luxurious Light Roadster \$775

BEAUTY

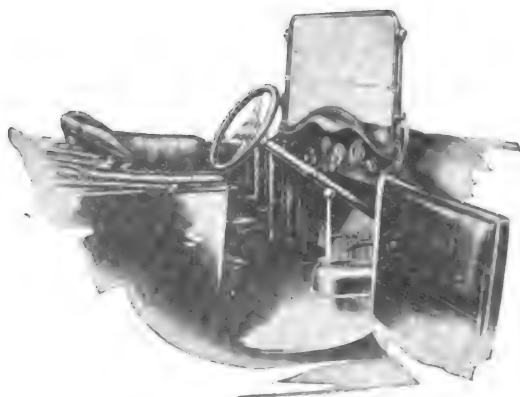
The Shows have proved the new standard of beauty and luxurious equipment of the new SCRIPPS-BOOTH cars.

Only a ride can convince you of their higher standard of comfort and personal motoring enjoyment which is the result of the adoption of the most up-to-date comfort principles.

Light weight is only one feature of these cars, making for easy riding and handling in the rough places.

SCRIPPS-BOOTH luxurious light cars are a new criterion of motor car comfort. Your dealer can convince you.

SCRIPPS-BOOTH
COMPANY,
DETROIT.



(When Writing to Advertisers, Please Mention The Automobile Journal.)

PUBLISHER'S AND READER'S PAGE.

The Feb. 25 issue of The Automobile Journal will be the advance number of the Boston show. One of its many valuable features will be complete specifications of every 1915 pleasure car, including both gasoline and electric. The specifications published in the Dec. 25 issue will be supplemented by those of the motor vehicles brought out since that time, and a complete list of the eight-cylinder models will be included. Each model will be illustrated, the names and addresses of the maker given and the different body styles and prices listed. These details will be so cross-indexed that the reader can obtain desired information easily and quickly. The edition will be a Buyers' Reference Number, thoroughly representative of the industry, and will be invaluable in assisting the prospective purchaser in making his selection.

Prosperity is the title of one of the feature articles in the Feb. 25 issue of The Automobile Journal. This discussion will be of particular interest to every business man and the trade, for it analyzes in a very interesting manner the automobile industry. The Automobile Journal's financial expert has made an exhaustive study of the situation, present and prospective, and his report will surprise the most optimistic. This article, which is well illustrated, is one of the best feature stories offered the readers of The Automobile Journal for some time.

Motor Starters will be discussed and illustrated in the coming number by one who has closely followed their development since their adoption. The article will describe how the energy of the motor starter is applied in the 1915 models and the method of control. The discussion was prepared with special reference to the reader not electrically or mechanically versed.

An Addition has been made to the set of mechanical hand books published by the Automobile Journal Publishing Company, publishers of The Automobile Journal, the Accessory and Garage Journal and the Motor Truck. The new book deals with the construction, operation, care and repair of the commercial vehicle, and is the most complete practical treatise on gasoline motor cars ever published. It is thoroughly up-to-date in every respect and should be in the hands of every owner and driver of a commercial car. All subjects are well illustrated and the instructions given can be followed easily by the novice. Motor Truck Operation is offered with the set of 10 mechanical hand books for \$4.75.

The Boston Show is the only event of the year at which commercial vehicles will be one of the features of the exhibits. The March issue of the Motor Truck will contain complete specifications, illustrations, prices, etc., of every commercial car manufactured. Orders for this number should be placed early.

When Writing for details and prices of accessories, equipment, supplies, etc., it is important that the proper address of the manufacturer be observed, particularly those makers advertising their product in The Automobile Journal. Many manufacturers produce different material, and maintain separate offices which have charge of all correspondence and details of the particular article. These departments are indicated by letters or numbers in the addresses of the maker and advertiser, and the addressing of communications to these departments will insure a

prompt reply. Always mention The Automobile Journal when writing, as special attention will be given such communications.

Partial Table of Contents.

	Page
*Setting the Stage for the Big Races.....	15
*Enters Three Knights in 500-Mile Race.....	20
*Organizes New Company.....	21
*Premier Offers New Six-Cylinder Car.....	22
Chicago Show Indicates Prosperity.....	25
Big Demand for Boston Space.....	25
Goodyear Tire Prices Reduced.....	28
*General News of the Industry.....	32
*New Accessories for the Motorist.....	33
*Practical Equipment and Supplies.....	34
*Road Conditions in Wyoming.....	36
*Correspondence with the Reader.....	38
*Unusual Service by Maxwell Company.....	40
Ford Makes Men Out of Convicts.....	41
*Remington Announces Eight-Cylinder Car.....	42
*In the Commercial Car Field.....	44
*Goodyear 1915 Rims.....	47
*Mechanical Notes for Owners.....	48
Editorials.....	50
*Case Featuring Model 25 for 1915.....	51
New and Proposed Motoring Laws.....	54
*Seaman Safety Device.....	55
*The Lincoln Highway in California, by George B. Harrison.....	56
*Brings Out Two New Models.....	60
*New Machinery, Tools and Equipment.....	61
News of the Manufacturer.....	65
*Suggestions for the New Car Owner.....	66
New York Garage Men Win Big Fight.....	69
Recent Patents.....	70
Coming Events.....	70

*Indicates article is illustrated.

SUBSCRIPTION BLANK.

Date _____

AUTOMOBILE JOURNAL PUBLISHING CO.,

TIMES BUILDING, PAWTUCKET, R. I.

Enter Order for the Following Publications:

(Designate by marking X in Space at Left of Titles)

—The Automobile Journal (Subscription, one year).....	@	\$1.50
—The Motor Truck (Subscription, one year).....	@	\$2.00
—The Accessory and Garage Journal (Subscription, one year).....	@	\$2.00

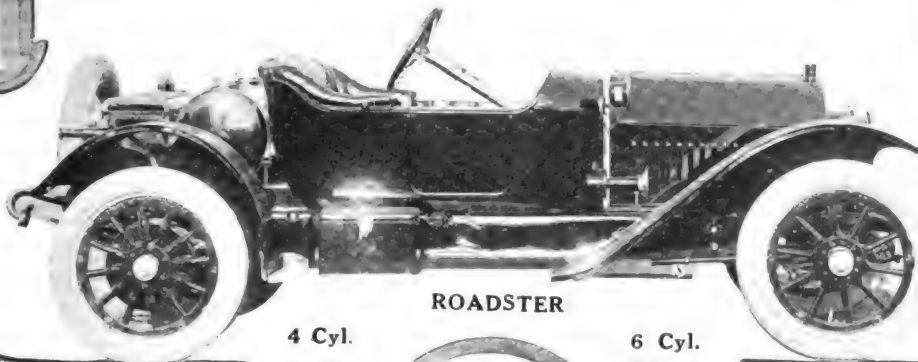
Enter Price for Each Book Ordered

Make Remittances by Check, Bank Draft, Postoffice or Express Money Order or Stamps. All Money Enclosures Are at SENDER'S RISK.

Name _____

Street _____

City or Town _____ County _____ State _____



ROADSTER

4 Cyl.
\$2000

6 Cyl.
\$2125



RECORD MAKING — SERVICE GIVING

NOT raced for prestige of victory, but to test and perfect design and construction that shall be absolutely dependable in hardest service, competition records prove the STUTZ to be the

FIRST AMERICAN CAR

Pre-eminent in quality and ideal for every purpose, STUTZ cars are built and finished to meet every requirement of those who demand greatest utility and automobile distinction.

FOUR-CYLINDER.

H. C. S. Roadster	\$1475
Benrent	2000
Roadster	2000
Bulldog	2250
Touring	2275
Sedan	3675

SIX-CYLINDER.

Benrent	\$2125
Roadster	2125
Touring	2400
Sedan	3800

Every STUTZ Dealer has the best line in the market. Learn the merits of STUTZ agency proposition by writing for it today.

STUTZ MOTOR CAR CO., : : Indianapolis, Ind.

When Writing to Advertisers, Please Mention The Automobile Journal.

Your Car Troubles and How to Overcome Them.

The most instructive and useful series of books ever offered to car owners, operators, garagemen, repairmen, experts and students is listed below.

The full set of 11 comprises a complete library of practical automobile mechanical information. Each book is cross indexed, which makes them works of reference as well.

When the motor gives trouble, read the engine book, and for all other components there is a book that is just as useful and valuable.

With this library in your possession you have just the information that you need and when you want it. To all those who have to do with power driven vehicles, a copy of one book or the series is worth many times the price for the full set.



TITLES

Engine . . .	35c
Magneto . . .	35c
Carburetor . . .	35c
Battery . . .	35c
Tires . . .	25c
Chassis . . .	25c
Lighting . . .	50c
Operation . . .	50c
Overhauling . . .	50c
Motorcycle . . .	35c
Truck Operation	\$1.00

11 BOOKS

All indexed
All complete
No theory
All revised
Up to date
800 pages of text
1500 illustrations
Including many series
of page charts and
working diagrams.

Money making and saving books for the owner, operator, student, dealer, garageman, supply man, agent and repairman.

Price Complete \$4.75, transportation charges prepaid

Automobile Journal Publishing Company

Times Building

Pawtucket, R. I.

SPLITDORF

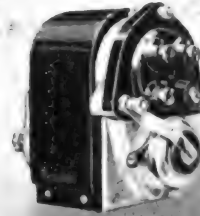
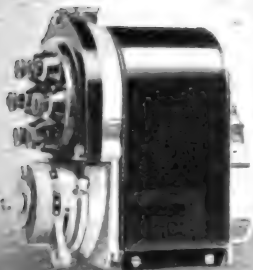
DIXIE
TYPE



MODEL EU4
HIGH TENSION
MAGNETO



CUNNINGHAM
HIGH TENSION
MAGNETO



MODEL EU4-2
HIGH TENSION
MAGNETO

**Largest MAGNETO
Contract Ever Placed**

OVERLAND

ignition for 1916 will
be exclusively

DIXIE

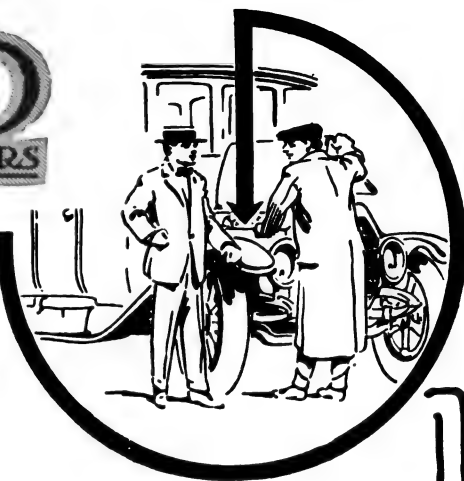
*The Willys-Overland Co. has placed
the largest magneto order ever given
for their entire 1916 output*

Not battery ignition—not the
19th century magneto, but
the 20th century DIXIE

SPLITDORF ELECTRICAL COMPANY
NEWARK, NEW JERSEY

RAYFIELD

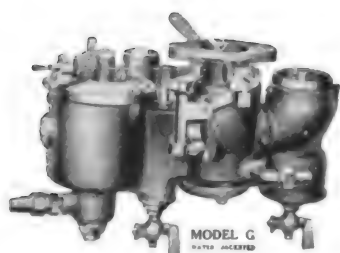
CARBURETORS



ONLY Quality Cars Use Rayfield Carburetors.

You can place a lot of confidence in the manufacturer who equips the car he offers you with the Rayfield carburetor, which is the best and highest priced carburetor he can buy.

That car is built on a quality basis or it wouldn't have the Rayfield on it. It would have some cheaper carburetor.



Your Rayfield-equipped car in the first month's driving will not only give you greatly improved all-around performance, because of the Rayfield carburetor, but it will save you enough in gasoline alone to more than make up the little extra it costs the manufacturer.

Rayfield equipment is the sure sign of a generously built car.

FINDEISEN & KROPF MANUFACTURING CO.

2127 Rockwell Street, Chicago, Illinois

Branches: 1140 Michigan Ave., Chicago

1211 Woodward Ave., Detroit

1902 Broadway, New York

When Writing to Advertisers, Please Mention The Automobile Journal.

THE AUTOMOBILE JOURNAL

THE NEW YORK
PUBLIC LIBRARY
647335
ASTOR, LENOX AND
TILDEN FOUNDATIONS
R 1915



Avenue of Palms
Which Forms
Part of the Van-
derbilt Cup and
Grand Prize
Race Course—
The Tower of
Jewels Is Seen
to the Left.

FOR the first time in the history of either the Vanderbilt Cup or the Grand Prize races, the stage setting will attract as much attention as the race itself. This year will see these two star events run through the Panama-Pacific International Exposition grounds, San Francisco, Cal., and the spectators will find their interest divided between the races and the gorgeous buildings that will flank each side of the roadway.

On Feb. 20 the exposition grounds will be thrown open to the world and, of the many spectacular events that are scheduled for the current year, the most exciting will occur during the first week. The Vanderbilt Cup will be the first event to be contested at the exposition, the date for this being set for Feb. 22, Washington's birthday. Five days later the Grand Prize race will follow, and the entrants in the Vanderbilt Cup are all entered to compete in this event also. The

Vanderbilt Cup race is 300 miles in length, and will require 76 laps of the 3.9 course. The Grand Prize is 100 miles longer and will require 103 laps to complete.

In the entire history of these events there has never been such a remarkable course provided. Laid out as it is between the walls of the most beautiful exhibition palaces that the world has ever seen, the races will provide thrills for every moment of the contests. At the same time the danger of accidents is reduced to a minimum. The roadway, asphalted throughout with the exception of the portion of the mile dirt track employed, is 200 feet in width and where the racers pass each other at intersections, going in opposite directions, the course is divided by barricades of baled straw anchored to the roadway by cables. This division line is a nine-foot wall, covered with burlap and pads. This constitutes the safest form of barrier ever employed on a course.



The Straightaway on the Vanderbilt Cup and Grand Prize Course—This Stretch of the Track Is Dirt, and the Other End Is Asphalt.

To date there have been 19 entries for each of these automobile classics, and there are several more expected to be heard from. The course provided will enable the hundreds of thousands of spectators to see practically every foot of the entire circuit. The latest cars to be entered are two Marmons and a Stutz, the entries being received by W. L. Hughson, chairman of the race committee. The Stutz entry was the third of this make to be listed and the combination will make one of the strongest teams in the races. In addition to the expectation that the races for 1915 at the Panama-Pacific International Exposition will prove to be the greatest of all record breaking contests, it is predicted that they will also establish new attendance marks.

From different parts of the United States applications are already being received for boxes, many of them coming from eastern manufacturers and racing enthusiasts of world-wide reputation.

Earl Cooper's recent victory at San Diego with the Stutz has once more demonstrated his ability to get away with the big prize events, and places him among the strongest competitors for honors in the exposition races. Eddie Rickenbacher is another driver whose reputation as a speed king will make him a prime favorite with the spectators

at the big events. Barney Oldfield and Billy Carlson will drive two of the Maxwell's. Rickenbacher will pilot the third, and

List of Entrants in Panama-Pacific Exposition Events as Received to Date.

Name of Car.	Driver.	Owner.
Stutz.....	Gil Anderson.....	Stutz Motor Car Co., Indianapolis.
Stutz.....	Earl Cooper.....	Earl Cooper, Los Angeles, Cal.
Stutz.....	Wilcox.....	Stutz Motor Car Co., Indianapolis.
Peugeot.....	.....	Peugeot Motor Car Co., New York City.
Peugeot.....	.....	Peugeot Motor Car Co., New York City.
Mercer.....	Eddie Pullen.....	Mercer Automobile Co., Trenton, N. J.
Mercer.....	.....	Mercer Automobile Co., Trenton, N. J.
Mercer.....	.....	Mercer Automobile Co., Trenton, N. J.
Marmon.....	Caldwell.....	W. D'Alene, Los Angeles, Cal.
Simplex.....	Louis Disbrow.....	Simplex Auto Co., New York City.
Chevrolet.....	Jack Le Cain.....	Chevrolet Motor Co., Flint, Mich.
Maxwell.....	Barney Oldfield.....	Maxwell Motor Co., Detroit, Mich.
Maxwell.....	Billy Carlson.....	Maxwell Motor Co., Detroit, Mich.
Maxwell.....	Rickenbacher.....	Maxwell Motor Co., Detroit, Mich.
Maxwell.....	Grant.....	Maxwell Motor Co., Detroit, Mich.
Duesenberg.....	Eddie O'Donnell.....	F. S. Duesenberg, St. Paul, Minn.
Duesenberg.....	Tom Alley.....	F. S. Duesenberg, St. Paul, Minn.
Delage.....	C. R. Newhouse.....	W. E. Wilson, Rochester, N. Y.
Tahiti.....	Jack Cable.....	Frederick Robinson, San Diego, Cal.

Harry F. Grant will handle the fourth. Up to the present time Ralph De Palma has not made his formal entry, but he is said to be a sure



The Final Turn of the 3.9-Mile Track at the Panama-Pacific Exposition Grounds, San Francisco, Over Which the Vanderbilt Cup and Grand Prize Races Will Be Run Feb. 22 and 27, Respectively—The Tower of Jewels and Other Buildings Are Seen in the Distance.

contender and will endeavor to duplicate his performance of last year in winning the Vanderbilt Cup in 3:53:41. This was the second time that De Palma walked away with the Vanderbilt Cup honors, and he has high hopes of securing the prize for the third time. The entries for both the Vanderbilt Cup and the Grand Prize events are given herewith, and it will be noted that the Mercer drivers have not yet been announced. However, it is safe to assume that Eddie Pullen, who won the 1914 Grand Prize, and recently hung up the world's record for road time, will be at the head of the Mercer team.

The grandstand, in front of which will be the start and finish of both races, seats 26,000 people and faces the bay of San Francisco. The practise work will be done between six and eight o'clock mornings, before the gates are opened to the public. Guards will see to it that the em-

winner of the Grand Prize. The Weed Chain Tire Grip Company, Bridgeport, Conn., offers a Weed bag filled with silver dollars for the driver who sets the fastest pace for the first 100 miles in the Vanderbilt Cup. This will amount to approximately \$250. The largest prizes offered to date have been made by the Bosch Magneto Company, New York. This concern offers \$1900 for the Vanderbilt Cup and Grand Prize events.

As outlined, the distribution of the Bosch prizes follows: To the winner of the Grand Prize, \$500, to the driver of the second car, \$150, and to the driver of the third car, \$100. The only condition to securing these prizes is that the driver in each instance use a Bosch magneto for ignition purposes during the race. For the Vanderbilt Cup the winner of the first prize receives \$300 from Bosch, the second man in gets \$150 and the third \$100. The conditions are the same



A Panorama of the Panama-Pacific International Exposition, Taken from the Dome of Festival Hall—The Tower of Jewels in the Centre, 435 Feet High, Conceals the Famous Golden Gate Entrance to the Bay of San Francisco—The Course of the Vanderbilt Cup and Grand Prize Races Is Shown in Front of This Building.

ployees of the exposition are kept from the course. The races will start at 10 o'clock in the morning and are expected to be over by two in the afternoon. It is estimated that several hundred-thousand spectators will view the contests.

In addition to the principal prizes for the winners of the two races a number of special prizes are being offered by manufacturers of automobile parts and specialties for the cars using their products and making the best time therewith. The latest addition to this list is one of \$500 offered by Franklin H. Wheeler, president of Wheeler & Schebler, manufacturer of the Schebler carburetor, to be given to the winner of the Vanderbilt Cup race, provided a Schebler carburetor is used. A similar prize is offered to the

as those for the Grand Prize. A second set of prizes has been arranged for the drivers in case they use, during the race, Bosch plugs in addition to Bosch magnetos. In each case, if his ignition equipment is completely Bosch, the driver, if first, second or third, is to be awarded an additional \$100.

The main prizes are the same as in previous events, namely, the cup trophy, donated by William K. Vanderbilt, Jr., as well as \$8000 in gold for the first five drivers to finish. The Grand Prize trophy is a gold challenge cup valued at \$5000, donated by the Automobile Club of America, New York City. In addition to the gold cup, a cash prize of \$8000 is offered to the first five drivers to secure place in the Grand Prize event.

It is stated by the various associations that thousands of motorists are en route over the Lincoln highway and other roads to attend the races.

STUDEBAKER EARNINGS \$4,000,000.

According to advance reports, the net earnings of the Studebaker Corporation, Detroit, Mich., will reach \$4,000,000 for the past year. Af-

of course, will make an excellent showing for the company this year.

APPOINT NEW YORK SECRETARY.

Herbert W. Baker, who for the past four years has been commissioner of publicity and head of the industrial bureau of Ottawa, Can., has been appointed general secretary of the New



At the Upper Left Is Seen the Half Dome of the Court of the Four Seasons; to the Right Is Shown the Main Entrance, South Façade, of the Palace of Education, and the Lower Illustration Is That of the Ornamentation of the Court of Flowers—The Slave Girl, Held in Chains of Flowers, Is Placed in Niches Around This Court.

ter allowing \$900,000 for dividends on the preferred stock, this leaves approximately \$3,100,000 for the common, equal to 11 per cent. on the outstanding \$27,931,600. This compares with a surplus of \$1,003,338, or 3.59 per cent. for the common in 1913.

It is pointed out that this increase in net is not caused by war orders, as very few of these were filled previous to Jan. 1. To date it is estimated that \$13,000,000 in war orders has been received by the Studebaker Company, and this,

York State Automobile Association, with headquarters at Albany, N. Y. According to A. J. Deer, president of the state association, who made known the appointment, Mr. Baker has been brought to New York because of his great success in civic work in Canada.

The Automobile Dealers' Association, New Haven, Conn., at its recent meeting, held at the Cafe Mellone, discussed matters pertaining to the conduct of the trade in that city.

WOMEN CAUSE DEVELOPMENT.

That the women of the United States are the direct cause of the wonderful automobile development during the past decade, is made clear by John N. Willys, president of the Willys-Overland Company, Toledo, O. "Much of the rapid evolution of the motor car from a one-lunged contraption of pain and sorrow to a smooth running, luxurious vehicle can be attributed directly to feminine influence", says Mr. Willys. "Woman", he adds, "has demanded and has been accorded her place in motordom just as she has demanded and received practically everything else she wants except the ballot, and doubtless she will eventually get that, as well.

"Motor car manufacturers who fail to heed feminine requirements have not made the success they might otherwise have achieved. In many cases it is the final decision of a man's wife, sister or sweetheart that settles the question of the car he is going to buy. Consequently, it is only natural that we should consider the needs of woman in the design and construction of our cars. From a woman's standpoint, a motor that require laborious cranking by hand is a relic of barbarism. She dislikes puttering around with gas tanks and matches in order to turn on the lights, and her aversion to the car that does not do away with these unpleasant tasks is more than a mere whim. An automobile without complete equipment is as inconvenient as a suit without buttons".

Mr. Willys points out that in the new Overland models, every essential and practical convenience known to the automobile world has been installed that will tend to add to the pleasure a woman can derive from a car. The electric starting and lighting system has reduced what was formerly manual labor to the simple pressure of a button. Upholstering has been deepened, springs lengthened and improved and the riding qualities enhanced in many ways to make her more comfortable. Rain vision windshields of the ventilating type protect her from the elements. Foot rests, robe rails and many other accessories and refinements have been installed in consideration of her interests. "If she desires to drive the car herself", says Mr. Willys, "the Overland switchbox, attached to the steering column just below the wheel, places the ignition, lighting, starting and horn controls within comfortable reach of her hand. With a slight pressure of the finger she starts the car, turns on the head, side, tail or dash lights and sounds the electric horn. She does not have to bend down or

stretch from her position once while driving. All indicating devices, including the magnetic speedometer, oil sight feed and ammeter, together with the carburetor priming button, are neatly and conveniently arranged in the cowl dash instrument board. With these advantages, combined with left drive and centre gearshift, the woman driver is given all the assurance of an experienced chauffeur".

GAIN IN GOODRICH EARNINGS.

An increase of 109 per cent. in net earnings for 1914 is the record of the B. F. Goodrich Company, Akron, O. The net profits for the year were \$5,440,000, as compared with \$2,599,747 for the previous year, and the final surplus, after the preferred and common stock dividends, was \$3,177,483, as against \$705,982 last year. A summary of the year's business shows:

	1914	1913
Net profits	\$5,440,000	\$2,599,747
Dividend on preferred stock....	2,048,500	2,100,000
Balance	3,391,500	499,747
Per cent. common stock.....	5.65	0.83
Common stock dividend		600,000
Preferred stock redemption.....	900,000	
Previous surplus	705,982	806,235
Final surplus	3,177,483	705,982

The company has on hand cash to the amount of \$4,175,000 and has no bills payable outstanding. The current assets total \$20,300,000 and the current liabilities are approximately \$1,470,000.

INSURANCE COMPANY INCREASES.

The stockholders of the Automobile Insurance Company of Hartford, Conn., voted to increase the company's capital stock from \$300,000 to \$1,000,000. With this increased capital the Hartford concern will enter the fire insurance field as, up to the present time, it has specialized in automobile accounts only. With its new issue the company will have a capital of \$1,000,000 and an extra surplus of the same amount, as the stock will be sold for \$200 a share. The principal stockholder is the Aetna Life Insurance Company.

DES MOINES IN LINE, TOO.

Work has been started in the Coliseum, Des Moines, Ia., in preparation for the annual automobile show to be held March 8-13, under the auspices of the Des Moines Dealers' Association.

ENTERS THREE KNIGHTS IN 500-MILE RACE.

FINLEY R. PORTER, formerly chief engineer of the Mercer Automobile Company, Trenton, N. J., and one of America's most noted automobile designers, will enter three Knight motor cars in the next Indianapolis 500-mile race. Mr. Porter is at present preparing to manufacture F. R. P. cars on his own account, and these machines will have a piston displacement of 207 cubic inches, with a bore of $3\frac{3}{4}$ inches and a stroke of $6\frac{1}{8}$ inches, four-cylinder type, capable of 3500 revolutions a minute. At the present time Mr. Porter's plant is located at Port Jefferson, N. Y., but he contemplates removing it to Indianapolis.



Rene Thomas, Who Has Been Relieved of Military Duty.

Another entrant for the Indianapolis race is W. W. Brown of Kansas City, Mo., who has entered a car of his own design. Though not well known nationally, Mr. Brown has considerable local reputation, having won several mid-western contests, including the R. H. Collins

Kansas City trophy race. The machine that he will enter in the Speedway contest has been pronounced extremely high-class by experts who have examined it, being fashioned after several of the latest foreign racing models, including the Mercedes, Peugeot and Delage.

The Ziegler entry will be missing from all racing contests in the future, as William Ziegler, Jr., of New York City, for years a backer of speed cars, has abandoned the sport and offers his machines for sale. Mr. Ziegler has been the victim of a series of misfortunes ever since he started racing. First, Marquis, driving one of his cars in the 1914 Vanderbilt contest, hit the ditch when leading the field at 87 miles an hour; next, Chassagne overturned in the Indianapolis

500-mile race, and finally, Grant, when running better than 90 miles an hour in the recent Corona, Cal., event, caught fire and was forced out of the contest. All of Ziegler's cars are considered exceptional values, particularly the two Sunbeams, which, because they measure only 273 cubic inches piston displacement, are eligible for the next Indianapolis 500-mile event. Despite the war there will be many foreign entrants on hand for the 1915 event.

THOMAS RELIEVED OF DUTY.

Rene Thomas, winner of the 1914 500-mile Indianapolis Speedway race, has been relieved of military obligation because of severe injuries sustained in the French aviation service. At the same time Thomas cabled that he would be in fitting condition for the 1915 500-mile event over the Indiana track. With the presence of Thomas and several other European drivers who are expected to announce their entries shortly, the success of the next Hoosier sweepstakes is thought assured.

SUNBEAMS IN 500-MILE RACE.

Two additional foreign entries have been made for the next Indianapolis speedway 500-mile race. Darius Resta, one of the most noted drivers of Europe, and Louis Coatalen, chief engineer of the Sunbeam factory, have both registered with two English Sunbeams of the latest valve in the head type. This brings the total Indianapolis entries up to seven, three of which are foreign. The piston displacement of the Sunbeam cars is 270.9 cubic inches, both having a bore of 3.7 inches and a stroke of 6.3.

MINNEAPOLIS SPEEDWAY PROJECT.

Guy A. Thomas has assumed active management of the Minneapolis, Minn., speedway project, and is to be one of the board of directors. F. H. Wheeler, of Indianapolis, will be president of the speedway company. Those who will do the immediate financing, and will later constitute the board of directors, in addition to the above-named gentlemen, include C. E. Dutton, Henry Habighorst and J. F. Sperry of St. Paul and Philip Buchner of Portland, Ore.

HANCH TO JOIN STUDEBAKER.

C. C. Hanch, treasurer of the Nordyke & Marmon Company, Indianapolis, Ind., will leave that company on March 1, to join the Studebaker Corporation, Detroit, Mich. Mr. Hanch has been with the Marmon Company for 18 years, and was loath to break away from that organization. In commenting on the change, Walter Marmon, president of the Nordyke & Marmon Company, said: "It is but natural that Mr. Hanch's recognized ability should have brought him many attractive propositions. This one from Studebaker offered such wide opportunities that he could not afford to resist it. I have been in touch with the negotiations from the beginning, and it is with the greatest reluctance on his part and ours that he severs his connection with our company, where his experience has been gained and where interest and affections are so deeply rooted. Mr. Hanch's duties will be divided among the other members of the executive organization of the Nordyke & Marmon Company".

Mr. Hanch will hold an important post in the executive organization of the Studebaker Corporation. He will continue a director of the National Automobile Chamber of Commerce, and as chairman of the patents committee, as the Studebaker Company is also a member of the N. A. C. C.

WILLIAM G. RANKIN DEAD.

William George Rankin, a well known member of the firm of Goodby & Rankin, Providence, R. I., died at his home Feb. 2, 1915, at the age of 46. Death was due to hardening of the arteries, superinduced by Bright's disease. Mr. Rankin was one of the Rhode Island veteran bicycle and automobile men, being one of the members of the Rhode Island Wheelmen. He was a manager of the Providence branch of the Pope Manufacturing Company and left that to enter the employ of Belcher & Loomis, in which he was a stockholder. Mr. Rankin was with this concern for 10 years and left to form a partnership with Albert E. Goodby, with whom he was affiliated in the sale of automobile and bicycle supplies at the time of his death.

TWOMBLY CORPORATION LIQUIDATES.

It is stated that the Twombly Car Corporation, New York City, is making preparation to liquidate its affairs. This concern has developed several types of small car, cyclecar and light car,

all of which have been designed by W. Irving Twombly. The report states that the concern will meet its indebtedness in full and later the company will be reorganized.

BATTERY CONCERN CHANGES NAME.

The name of the Titan Storage Battery Company, Newark, N. J., has been changed to the General Lead Batteries Company. However, the personnel of the company remains the same as heretofore.

ORGANIZES NEW COMPANY.

G. V. Nelson, former advertising manager and second vice president of the Auto Parts Company, Chicago, Ill., will organize a new company along the same lines in Kansas City, Mo., to be known as the Kansas City Auto Parts Company. Mr. Nelson will be president and general manager of the new concern. The new company will occupy a two-story and basement building at 1827 McGee street, where a complete line of automobile accessories and parts will be carried in stock. It is the intention of the new company, which will open about Feb. 23, to furnish parts and repairs for all cars.



G. V. Nelson, President of the Kansas City Auto Parts Company, Kansas City, Mo.

The Ford Motor Company, Detroit, Mich., following a custom inaugurated several years ago, has distributed a part of its annual profits in the way of Christmas presents among 200 to 300 heads of departments. The total amount is not disclosed, but it is said that it represented the output of about one-half the number of cars made in one day at the Ford plant, which would be about 800 or 1000 cars.

The Ford Motor Company, Detroit, Mich., following a custom inaugurated several years ago, has distributed a part of its annual profits in the way of Christmas presents among 200 to 300 heads of departments. The total amount is not disclosed, but it is said that it represented the output of about one-half the number of cars made in one day at the Ford plant, which would be about 800 or 1000 cars.

PREMIER OFFERS NEW SIX-CYLINDER CAR.

THE Premier Motor Manufacturing Company, Indianapolis, Ind., is offering a new six-cylinder chassis for 1915 to which will be fitted two

ample in size, the front being $1\frac{3}{4}$ inches long and the others $1\frac{1}{8}$. The exhaust manifold is placed on the right hand side of the motor, with the intake on the opposite side.

Particular attention is directed to the intake manifold, which is in the form of a ram's horn. It is constructed in three sections, flanged and secured by bolts. The lower section has three outlets on either side of the carburetor, or six in all. The carburetor is located between the two lower sections, and the mixture passes upward, then flows to the right and left through the horns. This arrangement brings the manifold in proximity to the top of the cylinders, where the heat assists in obtaining a

homogeneous mixture. The carburetor is the latest type Rayfield.

The lubrication is by a combination force feed and splash. Individual troughs under each connecting rod supply the splash feature and, as the level is maintained regardless of grades, etc., smoking is reduced to the minimum.

The cooling is by a V shaped honeycomb radiator having a detachable core. The core is enclosed in an aluminum casing, and the maker states that it is an advantage in that, as the core does not touch the casing, it is not affected by undesirable stresses. The twists and strains to



The Premier 6-50 Roadster, an Attractive Model Fitted with Wire Wheels and Completely Equipped.

body types, a touring, termed the Sextette, and a two-passenger roadster. Both are of the most approved streamline design, the attractiveness of which is emphasized by a V shaped radiator. The Premier 6-50 will sell for considerably less than \$2000. The new model is noticeable for its many refinements.

The new motor has a bore of four inches and a stroke of $5\frac{1}{2}$, and although the S. A. E. formula gives its speed at 38.6 horsepower, the maker states that it will develop 55 at 1000 revolutions a minute and 100 at 1950 revolutions a minute.

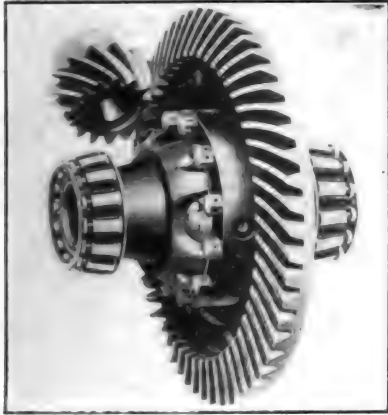
The cylinders are cast in triplets and have ample water jackets, assuring efficient cooling under all conditions of service. The valves are located on the right, have a diameter of $2\frac{1}{2}$ inches, and are interchangeable. The design makes for quiet operation, and provision is made for adjustment. The connecting rods are $12\frac{1}{2}$ inches from centre to centre, and the large end bearing is two inches in diameter.

The crankshaft is two inches in diameter, the camshaft $1\frac{1}{8}$ inches, and the camshaft bearings are



The Premier Touring Car, Termed the Sextette—It Has Divided Front Seats and an Aisle Between Them.

which the frame may be subjected are transmitted to the casing. Another advantage claimed is that the radiator is easy to repair and at a minimum of expense.



Primer Helical Pinion and Gear.

The Remy six-volt lighting, starting and ignition system is utilized, the generator being located at the left hand forward end of the power plant, and the drive is by a shaft through a flexible coupling. The motor and gearset are mounted as a unit on a three-point suspension, the rear arms bolting on to the frame, while the third point is obtained by pivoting the front into the centre of a cross arm. The multiple-disc clutch is continued, and the gearset provides the conventional number of speeds, three forward and a reverse. The gears are of chrome vanadium steel and Timken bearings are employed.

The front axle is a Timken I beam section type and roller bearings are utilized in the steering knuckle head. The rear axle is a Timken full floating design, and this year the Premier Motor Manufacturing Company has adopted the helical bevel and pinion. The gears are of chrome nickel steel and the teeth come into mesh by a point contact, and there are always two in mesh. Efficiency and quiet operation, as well as durability, are features claimed for the design.

The steering gear is the latest type Gemmer and has the push button of the electric horn located at the top of the steering column. The fuel feed is by the vacuum system and the 22 gallon capacity tank is hung rigidly at the rear of the chassis. It is stated that the tank may be easily displaced when desired. Left hand drive and centre control are employed.

The maker of the Premier claims the distinction of employing the longest springs of any pleasure gasoline vehicle marketed. They are of imported Sheffield steel, 60 inches long and

2½ wide. All the springs are subjected to a rigid test, both by the maker and at the factory, before being fitted to the chassis.

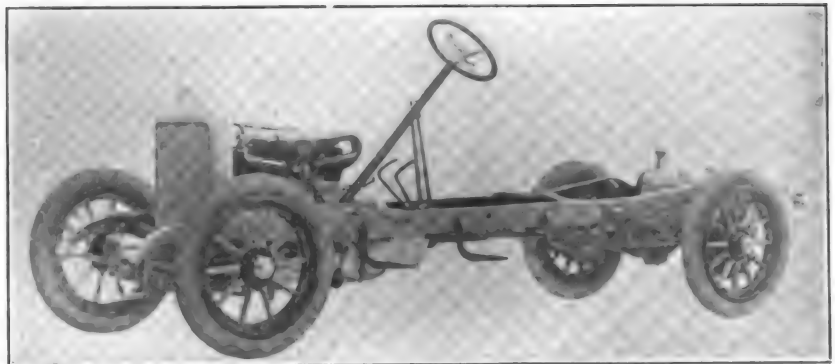
The frame is straight, of 5/32-inch stock, is 30 inches from tip to tip in front and 36 at the rear. The step hangers are of pressed steel and the front and rear spring hangers are drop forged.

The wheelbase is 132 inches and the wheels are of second-growth hickory, with 1¾-inch spokes, 12 in front and 14 in the rear. The tires are 36 by 4½ inches, front and rear. The brakes afford 526 square inches of surface, and the wheel drums are integral with the hub. The brakes are of the external contracting and internal expanding type. Both the clutch and brake pedals are adjustable for length at the pads and at the stems. The cut-out valve pedal is also adjustable.

The storage battery is accessible for attention and the distilled water may be added to the electrolyte without lifting the floor boards. The battery is swung from the outside of the frame and rests in a compartment entirely concealed from view. The raising of a panel on the running board affords access to the cells, and the tool compartment is similarly arranged on the other side of the car.

The Premier organization is styling its new body the Sextette. It is provided with disappearing auxiliary seats, and individual front seats with a seven-inch space between them are featured. The upholstery is deep and luxurious, and the material is a high-grade hand buffed leather.

Many refinements and conveniences are noticeable. There are foyer lights in the tonneau, and the top is the one-man design. A Kellogg tire pump is included in the equipment, which

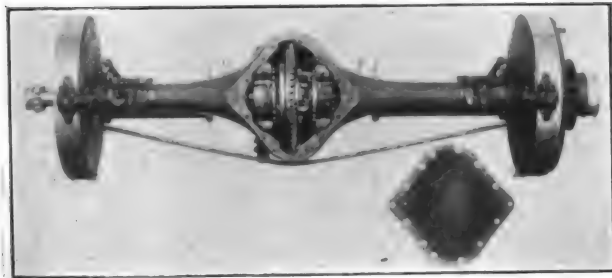


The Chassis of the Premier 6-50 Featuring the V Shaped Radiator.

leaves nothing to be desired. Many other details have been worked out carefully. The wiring is all on the cowl board, and this, with other re-

finements, have been the special care of Frank E. Smith, the new head of the Premier Motor Manufacturing Company.

The new Premier 6-50 will appeal to those



The Full Floating Rear Axle of the Premier—The Pinion and Gear, However, Are of the Helical Type.

motorists desiring a high-grade motor vehicle, one that has sufficient power to meet all requirements, and capable of being maintained at a minimum of cost.

CHANGE LINCOLN HIGHWAY ROUTE?

The sharp rivalry between two Utah cities, Ogden and Salt Lake City, may cause a change in the official route of the Lincoln highway.

The route planned by the Lincoln highway officials before the original proclamation of route was issued passed through Salt Lake City. Later, at the request of Governor William Spry of Utah, it was rearranged to include Ogden.

Ogden has since made desperate efforts to divert Lincoln highway motorists to the north of Great Salt lake, and away from the official course through Salt Lake City and thence around the lake via the southern route.

Citizens of Utah make no secret of the fact that the Lincoln Highway Association will be petitioned to cut Ogden off, and return to the original route.

Dr. C. Hart Merriam, the Washington, D. C., motorist, and road scout since the '40's, makes a vigorous protest against an article in one of the motor magazines which praises the northern route around the lake. He brands it as "outrageous misinformation" and says the editor has been grossly misled as to the relative merits of the two routes, with both of which the doctor has a thorough personal acquaintance.

S. D. Waldon, vice president of the Packard Motor Car Company, a noted touring authority, warns motorists not to be misled by Ogden advice into taking the northern route. The large amount of travel over the official route, he asserts, is a valuable safeguard to travellers.

"Even a breakdown in the middle of the Great American desert", he declares, "would be robbed of its dangers by the certainty that **within a few hours a car, motorcycle, prairie schooner, or man on horseback would pass, going one way or the other.** Every ranch along the southern route carries gasoline. Every ranch has water, and where the official route crosses the Great American desert, the county has put a well midway of the 60 miles of desert going. **Thirty of the 60 miles are better than any speedway I have ever travelled.** I have traversed this stretch in better than a mile a minute".

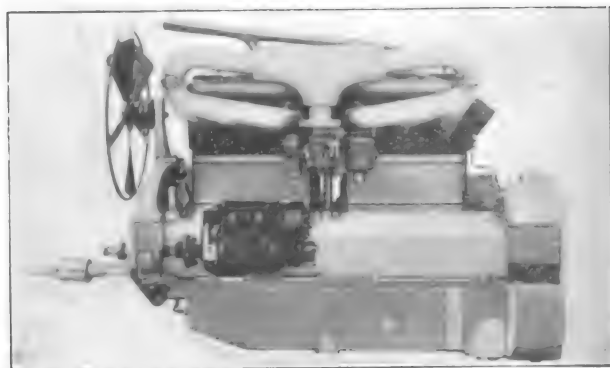
Mr. Waldon has driven 300 miles from Ely to Salt Lake City, the official of the two mooted routes, between 6 a. m. and 11 p. m., a record which could not possibly have been made over a road not clearly defined and in good condition.

Another thing in favor of the southern or official route around the lake, is that it goes through Ely, the best branching-off place on the Lincoln highway for Los Angeles, whither more than half the tourists wish to go.

AHARA HEADS ENGINEERS.

E. H. Ahara of South Bend, Ind., general superintendent of the Dodge Manufacturing Company of that city, has been elected president of the Indiana Engineering Society. Other officers elected were: U. S. Hanna, vice president; Charles Hurd, W. J. Schoonover and Albert Smith, trustees. H. O. German and L. W. Wallace are hold over trustees.

The society adopted a resolution urging the passage of a bill for an act authorizing the forma-



Illustrating the Ram's Horn Intake Manifold Utilized on the New Premier 6-50 Chassis.

tion of corporations for the practising of engineering under the provisions of the voluntary association act of 1910, pending before the general assembly.

CHICAGO SHOW INDICATES PROSPERITY.

Manufacturers Report Large Volume of Business Transacted and New Agencies Appointed—Attendance Exceeds That of Last Year.

IN KEEPING with all the principal automobile events of the current year, the 15th annual motor car exhibit in Chicago, Ill., proved to be a greater show than ever before. The attendance was 10 per cent. greater than the previous year, and from the standpoint of sales the dealers report that these far surpassed the 1914 record. While the actual attendance figures have not been prepared to date, Samuel A. Miles, general manager of the show, states that the gate receipts were at least one-tenth greater than they have been at any previous show.

At the former Chicago shows the number of dealers who attended never exceeded 3000, but this year the management prepared for at least 3500. However, by Thursday evening the 3500 mark had been passed and it was necessary to arrange for an additional 1000 who made their appearance during the last 48 hours of the show. Practically every manufacturer who exhibited has a story of unexpected sales and those whose territories were not previously closed find their field largely extended. According to all manufacturers' reports there were several trainload orders shipped as the direct result of sales made at the Chicago show.

As in previous years the Chicago event is a get-together occasion for manufacturers and dealers, and this season was no exception to the rule. Practically every company had a talk fest, and much good work was accomplished in the line of campaigns, sales methods and the planning for handling business for the approaching busy season. Perhaps the most notable event of the week, aside from the show itself, was the formation of a national association of garage men and dealers called the Associated Garages of America.

In the general layout of the show there was not much deviation from the established precedent. General Manager Miles gave the main floor of the Coliseum over to cars, and the gallery was occupied exclusively by accessory concerns. The Coliseum annex housed both cars and accessories, on the first and second floors, respectively, while the basement was given over to new comers. At the last minute the Greer build-

ing, located at the south of the annex, became a part of the show group. The armory, as usual, carried gasoline and electric pleasure cars on the main floor and accessories in the gallery.

Statistics show that the total number of gasoline pleasure cars exhibited were 254, divided as follows: Four-cylinder models, 120; four-cylinder sleeve valve, 13; six-cylinder models, 109; six-cylinder sleeve valve, one, and eight-cylinder models, 11. There were 200 different body types, 43 different chassis types, and 25 electric passenger cars. As for the body types the touring car predominated, there being 122 of this design, 42 roadsters, 11 limousines, six coupes, seven sedans, five cabriolets, four raceabouts and three broughams.

Taken all in all the Chicago show will go down in history as the greatest ever held there in every respect. The wonderful progress made in body designs during the past year, and the development of the eight-cylinder car were the two features of the show that will be long remembered.

BIG DEMAND FOR BOSTON SPACE.

There isn't a building in Boston, Mass., it is stated, large enough to house all of the motor car and accessory manufacturers that have applied for space at the automobile show which opens in Mechanics' building the evening of March 6, and concludes one week later. For a month every inch of available space has been taken and since that time Chester I. Campbell, manager of the show, has received almost 100 applications from pleasure car, truck and accessory manufacturers.

This unprecedented demand no doubt is due to the fact that this year it will be a combined showing of truck and pleasure cars. The truck makers came first, and closed contracts for space and as a result many pleasure car makers have been forced out. Last year when Mechanics' building was given over to trucks exclusively for one week, there were only 31 makes on exhibition, while the 1915 show has 29 listed.

Another interesting phase of the Boston event is the great number of accessory manufacturers

new to the New England trade that will exhibit. Last year most of the accessories were displayed by local agents and jobbers. This year the manufacturers are making the display and the great majority of them are to be seen at Boston for the first time. In the accessory department there will be 24 different makes of tires alone on exhibition, and this does not, of course, include any of the large manufacturers that make up the "tire group".

There will be nine new pleasure cars seen for the first time, including the Sterling four, Dort, Dodge, Scripps-Booth, Stewart six, Lewis, Allen, Enger, Grant and Milburn. This does not, however, embrace the manufacturers who are to show eight-cylinder cars. Among the new comers in the truck department will be the Rowe Motor Manufacturing Company, the Necto truck, Fitchburg, Mass., the Vim truck and the Robinson Fire Apparatus Company.

As it now stands, the list comprises 65 pleasure cars, four electrics and 29 truck exhibitors. If Manager Campbell could find space for all the applicants the Boston show for 1915 would smash all previous records.

PLAN FESTIVAL OF LIGHTS.

A festival of lights and decorations of the most unique and elaborate character ever seen at an industrial exhibit in that city will transform the staid interior of the state armory, Bridgeport, Conn., to a palace of dreams for the automobile show, Feb. 15-20. Myriad colored lights will be strung about the ceiling and 12 large chandeliers hung with hundreds of old fashioned pendant prisms will be suspended about the armory. The exhibit spaces are all taken and dealers anticipate a big business.

SPACE EXHAUSTED AT ALBANY.

That New York's capital will have a premier motor car exhibit this year is evidenced by the fact that every inch of available space has been leased. The Albany automobile show will be held Feb. 13-20, and it will include commercial vehicles as well as pleasure cars. The decorations will be Roman—the colors to be pale blue and yellow.

CHANGE MADE IN SHOW DATE.

The date of the Utica, N. Y., automobile show has been changed from the first week in March to the second. This was done because the Wa-

tertown show will be held the first week in March, and would, of course, inconvenience a number of dealers who are exhibiting in both places.

MANY EXHIBITORS FOR OMAHA.

Clarke G. Powell, secretary of the Omaha Automobile Show Association, Omaha, Neb., announces that the list of exhibitors for the motor car show to be held in that city, Feb. 15-20, is complete. These are:

Car.	Company.
Apperson Jack Rabbitt	Apperson Jack Rabbitt Auto Co.
Auburn	Auburn Auto Co.
Briscoe	Lininger Implement Co.
Bulck	Nebraska Bulck Auto Co.
Baker	Orr Motor Sales Co.
Cadillac	Cadillac Company of Omaha
Cartercar	Cartercar Nebraska Co.
Chevrolet	Doty, Inc., L. E.
Chalmers	Stewart-Toozer Motor Co.
Dort	Cartercar Nebraska Co.
Detroit	Motor Car Sales Co.
Dodge Brothers	Murphy-O'Brien Auto Co.
Davis	Wilson Auto Co., W. T.
Enger	Cartercar Nebraska Co.
Empire	Jeffery Omaha Co.
Ford	Ford Motor Co.
Glide	Traynor Automobile Co.
Grant	Wilson Automobile Co., W. T.
Haynes	Haynes Auto Sales Co.
Hudson	Smith, Guy L.
Hupmobile	Huffman Auto Co., W. L.
Inter-State	Motor Car Sales Co.
Jackson	Jackson Automobile Co. Branch
Jeffery	Jeffery Omaha Co.
KisselKar	Noyes Automobile Co.
Metz	Cartercar Nebraska Co.
Marion	Marion Auto Co.
Marmon	Marion Auto Co.
Maxwell	Maxwell Motor Sales Co.
Mitchell	Mitchell Motor Co.
Moline-Knight	Moline Automobile Co.
Moon	Traynor Automobile Co.
National	Traynor Automobile Co.
Oldsmobile	Drummond Motor Co.
Oakland	Lininger Implement Co.
Overland	Overland Omaha Co.
Paige	Murphy-O'Brien Auto Co.
Pullman	Northwall Co., T. G.
Packard	Orr Motor Sales Co.
Pierce-Arrow	Stewart-Toozer Motor Co.
Reo	Doty, Inc., L. E.
Rauch & Lang	Electric Garage Co.
Regal	Northwall Co., T. G.
Saxon	Lininger Implement Co.
Studebaker	Wilson Automobile Co., E. R.
Stearns-Knight	McIntyre Auto Co.
Velle	Deere Plow Co., John
Woods Electric	Drummond Motor Co.
White	Pelton Co.
Truck.	Company.
Avery	Avery Company
Bulck	Nebraska Bulck Auto Co.
Bull Tractor	Bullock Machine & Supply Co.
GMC	Murphy & Son, Andrew
International	International Harvester Co.
Kelly	Murphy & Son, Andrew
Overland	Overland Omaha Co.
Republic	Johnson-Danforth Co.
Signal	Huffman Auto Co., W. L.
Stewart	Murphy & Son, Andrew
Studebaker	Wilson Automobile Co., E. R.
Willys Utility	Overland Omaha Co.
White	Pelton, H.
Packard	Orr Motor Sales Co.
Motorcycle.	Company.
Indian	Omaha Bicycle Co.
Harley-Davidson	Victor Roos

NO INDEPENDENT SYRACUSE EVENT.

After a flurry of excitement caused by the fact that several dealers announced that they were going to hold an independent show, the idea has been abandoned and everyone interested in the automobile business has joined forces to make the seventh annual exhibition, which is to be held at the state armory under the auspices of the Syracuse Automobile Dealers' Association Feb. 23-27, a success. About a month ago several dealers who were not members of the association announced that they would hold an independent show at the same time as the regular show and secured an option on another building. But after going over the situation they found that they would be unable to get together enough cars to make it worth while and the plan was dropped.

A feature that is expected to be unusually interesting is the showing of used cars, and it is thought that it will be a step toward the solution of the vexing used car problem. The entire basement of the armory will be devoted to this department. This is the first time, so far as is known, that used cars have had space at an automobile show, and as their addition to the Syracuse display makes every branch of the industry represented, it is expected that the result of the experiment will be watched with interest. Cars that will be exhibited include:

Brockway, Buick, Cadillac, Case, Chalmers, Chandler, Chase truck, Chevrolet, Detroiter, Dodge, Ford, Franklin, Haynes, Hudson, Hupmobile, KisselKar, Maxwell, Mitchell, Moyer, National, Oakland, Oldsmobile, Overland, Packard, Paige, Palmer-Moore, Pierce-Arrow, Reo, Service truck, Signal truck, Studebaker, Stutz, White, Winton, Woods Mobilette.

ELECTRIC MEN TO BE AT BOSTON.

One of the big events of the Boston automobile show week, March 6-13, will be the convention of electric vehicle manufacturers, agents and accessory dealers, at the new Boston City Club, on March 10. This will be a part of a two days' gathering of electric light and power men from all sections of New England, to be held under the auspices of the New England section of the National Electric Light Association.

SPARKS COUNTY EXHIBIT SOON.

The Sparks county automobile and electrical exposition will be held in the Canton, O., auditorium, March 8-13. The management reports that the majority of the space has been taken, and before the opening night it is anticipated that

the hall will be crowded with exhibits to the last inch.

WASHINGTON DEALERS SAY NO.

According to present plans there will be no automobile show in Washington, D. C., this year. At the recent meeting of the Automobile Trade Association the subject was brought up, but received such a cold shoulder that it was not even put to a vote. The majority of dealers will not consider the staging of such an event until 1916.

BIG MONTREAL ATTENDANCE.

The Montreal, Canada, automobile show, which was held in the Ford building, Jan. 23-30, surpassed all previous similar events in every way. Each night's attendance was far in excess of the previous year, and record breaking sales were made.

ANDERSON SCHEDULED FOR FEB. 24-27.

The automobile and accessory dealers of Anderson, Ind., will hold an automobile show in that city, Feb. 24-27. So far only retail dealers are enlisted in the proposed show, but it is expected that local automobile factories will also enter exhibits.

SEEK NEW EXHIBITION BUILDING.

Officials of the Cleveland Automobile Club and the Cleveland Automobile Show Company have joined the co-operative movement to make a Cleveland exposition and convention building a reality before the time for the next automobile show.

GENEVA SCORES A BIG SUCCESS.

The fourth annual automobile show held in Geneva, N. Y., Feb. 3-6, was pronounced a huge success by all who were interested. This event was scheduled to be held between the dates set for the Buffalo and Syracuse shows, and the dealers found it a very wise plan.

During 1914 the State of Vermont received \$154,344 from automobile licenses, according to Guy W. Bailey, secretary of state. There were 8262 cars registered between Dec. 1, 1913, and Dec. 1, 1914, and 214 of these were commercial vehicles.

GOODYEAR TIRE PRICES CUT.

The Goodyear Tire and Rubber Company, Akron, O., announces another big reduction in Goodyear tire prices, which became effective Feb. 1. This makes the third reduction in the past two years, the total of which is 45 per cent. Speaking of this new reduction, C. W. Seiberling, vice president of the Goodyear Company, says: "Our present action is entirely logical and is based on the lower cost of crude rubber, the largest factory production in the world, the facilities afforded by ownership of our fabric mill, our world-wide organization that gives us certain important advantages in purchasing crude rubber, and a desire to continue to give tire users the most for their money."

"In going forward on the new basis, we are happy to announce several refinements in Goodyear tires, at an added cost, to insure greater service, even in the face of a price reduction. Ours is the only company that continues to use the costly wrapped-tread process of manufacture, with the on-air cure, features relinquished with regret by other manufacturers with smaller output, because of the expense attached. Goodyear three-inch tires have four plies of the strongest fabric, many others three plies, making our three-inch offering the strongest possible. Our 4½-inch tires have six plies of fabric against the usual five. In the five, 5½ and six-inch sizes we are using a heavier tread and carcass than ever before, the result being fewer punctures and longer wear."

"Our achievement in tire fabric is also a source of satisfaction to ourselves as well as to tire users. As the result of experiments in our own mill, we have a fabric that is fully five per cent. stronger than any we have ever been able to obtain on the market. So, in making announcement of our price reduction and plans for the year, we consider that we are in a better position than ever to maintain the leadership in tire-dom. Last year our output increased 26.6 per cent.; we made and sold a million and a half of tires. For years we have kept our profit margin as low as safety would permit, and volume has enabled us to make satisfactory annual showings. Our present announcement is fully in line with that policy."

GRANT COMPANY ELECTS OFFICERS.

At the annual meeting of the Grant Motor Company, Findlay, O., the following officers were elected for the coming year: David A. Shaw,

president; George D. Grant and George S. Salzman, vice presidents; George S. Waite, secretary and sales manager. The board of directors for the next year include the above gentlemen, together with Roger R. Hall, A. E. Dorsey and J. M. Howe.

The secretary's report showed an excellent past season's business with the Grant four-cylinder roadster, and unequalled prospects for 1915 sales following the introduction of the new Grant six. According to Sales Manager Waite, orders already on the books of the Grant Company call for the capacity operation of the factory for some months to come. Additions to the floor space and an increase in the working force of the Grant factory are under consideration and it is expected to have all departments at their highest efficiency before the rush of spring deliveries sets in. Mr. Waite says that one of the unique features of Grant plans for the coming year will be the shipment of as many trainload lots of cars to its distributors as possible. Practically every dealer has written in doubling or tripling his original orders, and this will mean trainload shipments, as the original orders were far from small in number.

WHITE ISSUES NEW CATALOGUE.

Under the title of "White Motor Cars—Incomparable", the White Company, Cleveland, O., has issued a new 20-page, 10 by 12-inch catalogue, which fully describes its 30, 45 and 60 models. This book is replete with photographs, all of which are printed in the actual colors. The 4-40 White touring model is shown in its dark rich Brewster green color, with a snappy red for the spokes and rims of the wheels, while facing it is the 4-30 roadster in black and buff yellow, the body carrying the latter color. Scattered throughout the book are smaller illustrations of the features of the White cars, such as the double cowl, unified control, concealed tool box, etc. The book is designed, engraved and printed by the Caxton Company, Cleveland, O.

L. P. C. STOCK INCREASED.

An increase from \$250,000 to \$350,000 has been made in the stock of the L. P. C. Motor Company, Racine, Wis. The directors have elected the following officers: William Mitchell Lewis, president; J. M. Cram, vice president; F. S. Gordon, secretary, and G. B. Wilson, treasurer.

GENERAL NEWS OF THE INDUSTRY.

Property of Lozier Motor Company, Valued at \$4,000,000, Brings \$1,200,000— Referee Refused to Confirm First Sale—New Concerns and Business Changes.

AFTER selling the property of the Lozier Motor Company, Detroit, Mich., in the bankruptcy court for \$840,000, L. E. Joslyn, referee, refused to confirm the sale. A final effort was made by the receivers, and as a result a guaranteed bid of \$1,000,000 was received. This includes everything except the Plattsburgh, N. Y., plant, and it will net the creditors about 30 per cent. on their claims after the costs of court and attorney fees are paid.

In addition to the \$1,000,000 for the Detroit property, the receivers sold the Plattsburgh plant for \$200,000. The buyers were Charles Friedburg of New York and Frank Brothers and Harris Brothers of Detroit, for the Detroit property, and Charles Shongood of New York, for the Plattsburgh plant. The sale was held before Referee Joslyn, with Joseph A. Bower as auctioneer. There were about 75 on hand for the sale, but the interests named above were the principal bidders in each case. The bidding began at 10 o'clock on Feb. 4 and the property was first offered in parcels, as advertised. The highest aggregate for these parcels totalled only \$765,000, and when offered as an entirety the sum of \$840,000 was bid.

Charles Shongood offered \$200,000 cash for the Plattsburgh property, and following his bid Mr. Shongood individually offered to guarantee a liquidation of the balance of the assets of \$640,000. The value of the entire property was placed at \$4,000,000 by the company, and included buildings, machinery, land, service and repair stations, accounts and notes receivable, etc.

GRAY & DAVIS SALES \$4,000,000.

For the year 1914, according to advance reports, the sales of Gray & Davis, Inc., Boston, Mass., were in excess of \$4,000,000, a new record high mark. The net earnings are equivalent to about six times the preferred dividend requirements, and the outstanding amount of that stock has been increased from \$500,000 to \$750,000 during the past year. At the present time the Cambridge, Mass., plant is running full time and the

smaller Amesbury, Mass., mill is working day and night. One of the most satisfactory 1915 developments has been the extent of the demand.

FINDEISEN MADE SALES MANAGER.

C. W. Findeisen has been appointed general sales manager of the Findeisen & Kropf Manufacturing Company, Chicago, Ill., maker of the Rayfield carburetor. Walter Findeisen, as the new sales manager is known to his friends, has grown up in the Rayfield carburetor business from its beginning. Although the son of the president of the company, he has had to push his way forward by force of merit and those who are familiar with the Rayfield business recognize in Mr. Findeisen's appointment the selection of the right man to fill this responsible position.

Mr. Findeisen began his work in the factory and has been thoroughly schooled in every department of the company's large business. For the past four years he has been in active charge of the factory sales and stepped naturally from this position into full charge of all sales. It is understood that contracts in hand promise a heavy increase in the Rayfield business, both on low and high-priced cars.



C. W. Findeisen, Appointed General Sales Manager of Findeisen & Kropf Manufacturing Company.

McQUAY-NORRIS REPRESENTATIVE.

The McQuay-Norris Manufacturing Company, St. Louis, Mo., maker of the Leak-Proof



Charles L. Derrickson, General Representative of the McQuay-Norris Manufacturing Company.

of the Leak-Proof piston ring manufacturer, and exemplifies the progressiveness of the company.

DELCO'S RECORD BREAKING BUSINESS.

Reports from the various automobile shows already held, are filled with the spirit of optimism and confidence and there is every reason to believe that all the events have yielded excellent results in actual business. No better evidence of the sound and healthy condition of the industry can be found, however, than in the present business of some of the great accessory concerns furnishing equipment by contract to the larger motor car companies. For example, the Dayton Engineering Laboratories, Dayton, O., manufacturer of the Delco electric lighting, starting and ignition systems, is pushing through a production that proves the active condition of the automobile market.

The Delco plant is now exceeding all its former records. Last week was the biggest this company ever had, the average production being 450 sets of Delco equipment a day, and this week the output is practically the same. This is not a temporary spurt, the company says, and during the short month of February the Delco factory at Dayton must turn out 12,000 sets, contracts obli-

gating the company to deliver that number. This production will be nearly 3000 sets greater than the biggest previous month in the company's history.

VULCAN COMPANY BANKRUPT.

The Vulcan Manufacturing Company, Painesville, O., has been declared bankrupt by the United States district court, following a creditors' petition. Carl D. Friebohn has been appointed receiver, and he states that the company will make an offer of settlement with the 400 creditors on its books. The Vulcan Company was organized about two years ago and was capitalized for \$200,000, establishing a plant in Painesville for the manufacture of motor cars. The factory employs about 150 men and is Painesville's largest industry. The directors are E. D. Heartwell, F. H. Murray, J. C. Ward, William Truby and H. E. Hammer.

According to the receiver the company has over 100 unfilled orders on hand, and was contemplating opening a branch in Cleveland, O. It is maintained that the total liabilities are approximately \$100,000.

MAXWELL COMPANY PROSPEROUS.

Walter E. Flanders, president of the Maxwell Motor Company, Inc., Detroit, Mich., states that his com-

pany's sales for the past six months have been far beyond his expectations. He says: "Our production figures are most satisfactory, and are steadily climbing, and dealers are clamoring for the Maxwell line. Our report for the last year's business shows a wonderful gain over the previous year.

From August to November we employed an average of 2000 more men a day than



Walter E. Flanders, President of the Maxwell Motor Company, Detroit, Mich.

during the first six months of the year, with an increased monthly pay roll of something like \$131,000 a month, and are steadily increasing our forces preparatory for spring business. In spite of the general conditions brought about by the European conflict, we were able to show a net profit the first fiscal year of over \$1,500,000. Maxwell stock today is listed on the New York exchange, and we anticipate another most successful year.

"Personally, I believe that the best late news regarding the Maxwell is the recent wonderful achievement of Barney Oldfield at Corona, when he drove his Maxwell 301 miles without stopping, and Billy Carlson at Point Loma, San Diego, duplicating this marvelous record by driving another Maxwell racing car 305 miles without a stop over the most difficult and dangerous course in America. Oldfield's car at Corona consumed but 23 gallons of gasoline and three gallons of oil, while Carlson's car on a much heavier road consumed but 27 gallons of gasoline and three gallons of oil".

J. V. HALL IS OPTIMISTIC.

J. V. Hall, sales manager of the Oldsmobile, made by the Olds Motor Works, Lansing, Mich., believes that the spring months give promise of great prosperity for automobile manufacturers, and he offers four reasons for his conclusion: "Firstly", says Mr. Hall, "December is commonly regarded as the dullest month of the year in the automobile business and for that reason more than any other it is a safe gauge of future conditions. With a large body of manufacturers December, 1914, was the best December experienced in many years. It was found necessary in our plants to speed up production to a considerable extent and even then we finished the month considerably behind our orders. Business in the large cities was exceptionally good. Our San Francisco branch delivered 13 cars at retail in one day.

"Secondly, practically all of our dealers are making preparations for handling an unusually large spring trade and many of them have stated that their contract specifications will in all probability be insufficient for their requirements.

"Thirdly, South American markets are expanding rapidly. I learn this not alone from reports of mercantile agencies, but from the amount of correspondence received from concerns who are willing to consider propositions to handle American made automobiles.

"Fourthly, our business in the dead of winter

furnishes ample evidence that conditions are strengthening steadily. Cars already ordered for January and February will keep our plants very busy during these two months. These advance orders indicate that dealers expect the spring demand to be unusually strong and to set in unusually early".

ANOTHER POPE PLANT SOLD.

The west works of the Pope Manufacturing Company, Hartford, Conn., have been sold to P. Garvan, Inc., a Hartford paper house. The Garvan concern offered a flat price of \$80,000 for the remaining plant, and inasmuch as it was appraised at \$110,000, the receiver secured 73 per cent. of its value. The deal disposes of the last piece of property the company owns in Hartford, Pratt & Whitney having recently bought the main plant for \$300,000.

The only remaining Pope plants are in Westfield, Mass., where bicycles and motorcycles are being made, and it is the intention of the receiver to dispose of this as a going concern.

RYAN JOINS DETROIT LUBRICATOR.

James Ryan, for the past three years the Indianapolis representative for the Rayfield carburetor, has resigned to take up work with the carburetor division of the Detroit Lubricator Company, Detroit, Mich., manufacturer of the Stewart carburetor. Mr. Ryan's experience in the automobile and carburetor business as an engineer and demonstrator, covers a period of 12 years, during which time he has become familiar with practically every phase of automobile and carburetor testing and experimental work in connection with both racing and pleasure cars.

B. F. GOODRICH DIVIDEND.

The B. F. Goodrich Company, Akron, O., has declared a dividend of 3½ per cent. on the preferred stock, 1¾ per cent. payable April 1 to stockholders of record March 19, and 1¾ per cent., payable to stockholders of record June 18.

CHANGES IN PILOT COMPANY.

T. H. Hillwho, treasurer and general manager of the Pilot Motor Car Company, Richmond, Ind., has resigned. George Seidel, president of the Pilot Company, succeeds Mr. Hillwho. In addition to being president of the Pilot concern, Mr. Seidel is president of the Seidel Buggy Com-

pany, Richmond, and also president of the Richmond Commercial Club. Mr. Seidel will devote his entire attention to the management of the Pilot Motor Car Company, which is expected to do a large business during the current year.

OLDSMOBILE MAKES APPOINTMENTS.

At a recent convention of Oldsmobile salesmen at the Olds Motor Works, Lansing, Mich., arrangements were completed which will enable the road men to work to the best advantage in definitely allotted territories during the busy season ahead. Several new appointments were announced during the convention by J. V. Hall, sales manager. W. J. Drumpelmann, who established a sales record as central district manager of the Lozier Company, was appointed general district manager with headquarters at the factory. E. A. Hart, D. E. Ford and F. A. Gross, formerly factory representatives, were promoted to the positions of central, southwestern and southern district managers, respectively.

McINTYRE GETS STEARNS TERRITORY.

The F. B. Stearns Company, Cleveland, O., maker of the Stearns-Knight cars, has concluded a deal with the McIntyre Automobile Company, one of the largest distributors in the Nebraska-western Iowa district. This is one of the largest contracts ever given to a single distributor by the Stearns Company, and it represents one of the richest fields in the country. The McIntyre Company has a large number of contracts on hand in the small towns and cities throughout these two states.

COLBY AFFAIRS IN COURT.

A case involving \$275,000 will be heard in Mason City, Ia., shortly, growing out of alleged financial difficulties in the management of the Colby Motor Car Company of that city. The Colby concern went into a receiver's hands over a year ago.

S. H. VEAL NOW WITH SAXON.

S. H. Veal, formerly secretary of the Colt-Stratton Company, New York City, eastern distributor for the Cole car, and for many years secretary and New York manager for the Cleveland Motor Car Company, has joined the forces of the Saxon Motor Car Company as travelling representative for the State of New Jersey. Mr. Veal

will make his headquarters at 278 Halsey street, Newark, N. J., which will be the sales rooms of the Essex county Saxon branch.

FISK REPORTS INCREASED EARNINGS.

The Fisk Rubber Company, Chicopee Falls, Mass., reports a big increase in all earnings for the fiscal year ending Oct. 31, 1914. The net profits increased from \$606,000 for the previous year to \$942,204 last year, and the final surplus, after dividends were paid on the preferred stock, was \$432,204, an increase of \$229,725. In accordance with the first preferred stock provisions there was retired, Dec. 31, 1914, out of the profits, 2250 shares of those securities.

PARROTT BUYS OAKES INTERESTS.

W. H. Oakes of the Oakes Company, Indianapolis, Ind., manufacturer of the Beartone horn and fan, announces that R. B. Parrott has become a stockholder in the Oakes Pressed Steel Company, Indianapolis, Ind., and is actively associated with the company, having charge of the buying. Mr. Parrott is an experienced automobile man, having been associated with the industry for some time in Indianapolis.

ALLEN LEAVES FOR PACIFIC COAST.

C. Louis Allen, general sales manager of the Pyrene Fire Extinguisher Company, New York City, has left for a six weeks' tour of the Pacific Coast. Mr. Allen will reach San Francisco a few days before the exposition opens, Feb. 20, and will look after the Pyrene exhibit. He will also take in the two big races, the Vanderbilt Cup and the Grand Prize, Feb. 22 and 27, respectively.

REDUCE ASSOCIATION'S STOCK.

A special meeting of the Automobile Dealers' Association of New Orleans, La., recently held at the De Soto hotel, was called for the purpose of amending the charter and to reduce the par value of the stock. This move has increased the membership materially.

FROST STOCK IS INCREASED.

The capital stock of the Frost Gear and Forge Company, Jackson, Mich., has been increased from \$300,000 to \$400,000. The company increased its stock to \$300,000 last year.

NEW ACCESSORIES FOR THE MOTORIST.

THE "GRIP-TITE" GLOVE.

Has Extra Palm, Affording a Secure Grip on Steering Wheel.

The Morrison-Ricker Manufacturing Company, Grinnell, Ia., is producing what is termed the "Grip-Tite"



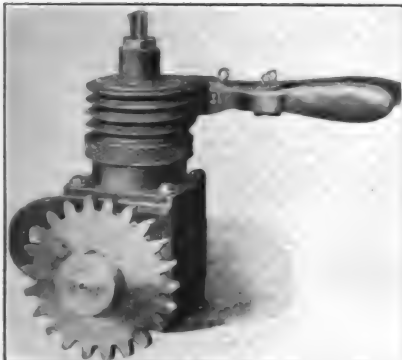
glove. It is provided with an extra palm so sewed that the leather puckers between the stitches to form corrugations. It is stated that these corrugations afford a firmer grip on the rim of the steering wheel than with regular gloves, and that the design is more enduring. The "Rist-Fit" closing device is designed to prevent the cuff from sagging down over the hand. The one-fingered mitten shown is lined with elder-down wool and is supplied with either a gauntlet or with a web wrist.

MANZEL POWER TIRE PUMP.

Designed Particularly for the Ford Car and Is Very Compact.

The Manzel Bros. Company, 335 Babcock street, Buffalo, N. Y., has brought out an engine driven tire pump for the model T Ford automobile. This concern specializes in power driven pumps, and the new design is constructed of the same high-grade material and workmanship for which the products of this concern are noted. The Ford pump is moderately priced.

The pump is installed on the left hand side of the motor, and the support for attaching it is included in the equipment. The maker states that anyone can install it in 45 minutes, and there are no holes to be



drilled or machine work to be performed. The pump is an all-metal construction, and all its parts are accurately ground.

The old fan pulley is discarded and one carrying a gear is utilized. This gear is the driving member, meshing with a gear on the shaft of the pump. A convenient handle is provided for throwing the gears into mesh, and the equipment includes hose, etc. The pump supplies pure air, free from any lubricant, and the maker states it will inflate a tire in 90 seconds.

DELTA ELECTRIC HAND LAMP.

Includes Battery and Dry Cell, and Has Two Handles.

The Delta Electric Company, Marion, O., maker of electrical specialties, is manufacturing the Delta electric hand lamp, which will appeal to motorists whose cars are not equipped with an electric lighting system, as the lamp affords means for illumination when making adjustments about the car and when it



is not advisable to use a light having a naked flame.

The lamp is equipped with a double-convex ground and polished lens, which, with a special reflector, diffuses the light, making it adaptable for service where the rays are not to be thrown a long distance. The battery is contained in a nickel plated cylindrical body, has a ball handle, also a grip on the back.

One of the desirable features of the construction is that a single dry cell is employed, and the maker states that the bulb is very economical of current. The Delta lamp is very compact and may be stored easily in the tool box. When the service of a trouble or inspection lamp is desired, the Delta will save time, as there are no connections to be made.

Ed. Note—The Feb. 25 issue of The Automobile Journal will be the advance number of the Boston show. Manufacturers desiring their products described and illustrated in this department must forward illustrations and descriptive matter promptly to insure publication in this special issue.

THE FUQUA REST.

A Practical Support for the Foot of the Driver of the Car.

The Fuqua foot rest is the invention of T. C. Fuqua and is manufactured by Fuqua Bros., Richmond, Va.



As the name implies, it is a rest or support for the foot of the driver, and one of its advantages is that it can be adjusted to meet requirements. As may be noted by the accompanying illustration, the rest proper is attached to a threaded column, which screws into a standard. The rest is prevented from moving by a lock nut. The maker states it will fit any car with pin or lever throttle.

The Fuqua foot rest not only saves wear on the shoe and toe board of the machine, but prevents accidental or sudden acceleration when traversing rough roads. It is made in three finishes, brass, nickel or gun metal.

STEWART PERFECT LOCK.

A Device with Fastening for Holding up Cover of Deck on Ford Car.

A practical device, one that should appeal to owners of the model T Ford roadster, is the Perfect lock, manufactured by the Stewart Specialty Company, 79 East Chestnut street, Columbus, O. As may be noted by the accompanying illustration, it holds up or opens the lid of the rear deck of the car, which is a decided convenience when parcels are to be removed or articles placed in the compartment.

The device can be installed without drilling, only a wrench being necessary. Although made for the Ford, it will fit other makes, and one of its advantages is the provision afforded for a lock. The Perfect lock is inexpensive.

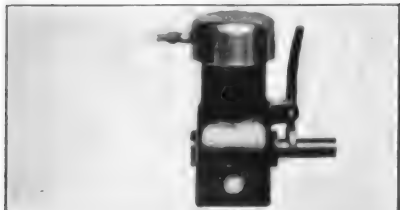


PRACTICAL EQUIPMENT AND SUPPLIES.

LIPMAN POWER TIRE PUMP.

New Model Is Known as the 21 and Is for 1915 Cars.

The Lipman Air Appliance Company, 700 Pleasant street, Beloit, Wis., has brought out a new model



of power driven tire pump listed as the model 21. It has a large bore and short stroke, and is supplied with gears, hose and bracket for attachment to the majority of the 1915 models not equipped with a power tire pump.

The pump is an all-metal construction, has a drop forged ground crankshaft, and the cylinders and pistons are of a special gray iron. Both the inlet and exhaust valves are located in a special head plate, and a hood prevents the entrance of foreign elements. The pump has a gearshift lever with a positive lock.

THE GEM PRIMER.

Takes Fuel from Main Line and Forces It to the Cylinders.

The Gem Primer Company, Springfield, O., is manufacturing the Gem primer, which the maker states will make easy the starting of the motor without spinning, either mechanically or manually. The device provides for utilizing gasoline from the supply line and forcing it under pressure into each cylinder.

The appliance fitted to the dash of a car is shown in the accompanying illustration and, as may be noted, the vertical pipe is connected with the fuel supply line. Leading from the unit are the tubes which connect with the priming cocks or spark plugs.

A slight turn of the piston member opens the supply line, and a single reciprocation of the piston out and in forces the fuel through the tubes to the cylinders. Special spraying nozzles are provided, these connecting the tubing with each cylinder, and a ball check valve prevents any leak on the compression stroke of the piston. The check valves screw into the cylinders in place of

the petcocks, and a special connection is made for the Ford motor. The maker states that the Gem primer can be attached to any car.

ECONOMY GASOLINE DEVICE.

Utilizes Heat of Exhaust to Warm Fuel and Is Practical.

The Inst Lighter Company, Columbus, O., which has been specializing in motor vehicle specialties for a number of years, has brought out the Economy gasoline improver for the Ford and other cars. The device presents a number of interesting, as well as practical features and, as the name implies, increases the mileage obtained with a gallon of fuel.

The principle involved is that of utilizing heat to warm the fuel, thereby assisting in vaporization. Another advantage of the use of heat, one that is being recognized by many motor vehicle manufacturers, is that a more perfect mixture is obtained, one that is completely and quickly burned in the cylinder.

A desirable quality of the Economy gasoline improver is that it can



be installed on the Ford car, for example, without disturbing the fuel line or carburetor. The maker claims that it can be attached in less than 10 minutes by the novice, the work involving but the placing of the device on the exhaust pipe and tightening two bolts retaining the sections in place.

The heat of the exterior walls of the exhaust pipe is utilized, it being conducted to the walls and interior of a cylindrical chamber, through which the fuel pipe runs. This chamber is filled with a soft metallic pad, and the fuel in passing through the section of the enclosed pipe is heated. The Economy is eight inches long and three wide and, as previously stated, can be attached without displacing or cutting the exhaust line. It is inexpensive.

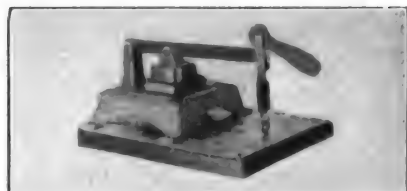
POWER TIRE PUMPS.

One of the more recent developments in the accessory field is the perfection of the power tire pump. Several manufacturers are specializing on an equipment for the used motor vehicle, and in practically every case the pump comes complete with fittings and can be easily installed.

HORSEY PONY VULCANIZER.

Special Design for Use with Horsey No-Cement Patches.

The Horsey Manufacturing Company, 6104 Euclid avenue, Cleveland, O., is producing the Horsey pony vul-



canizer for repairing inner tubes. It was specially constructed to demonstrate that the Horsey no-cement patches can be vulcanized after application without the use of cement.

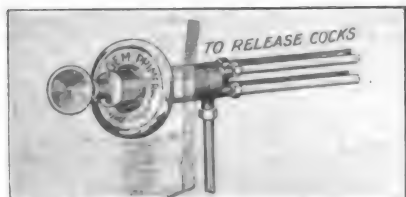
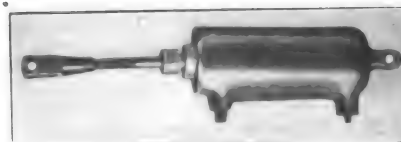
The new vulcanizer is constructed on the principle of the large types, and the maker states that it is the only design having a spring tension on the tube when in service. It can also be handled without danger of burning the hands. Denatured alcohol is employed for a fuel, and a steady, uniform heat is obtained. The vulcanizer is five by six inches, is mounted on an eight by 10 board protected by galvanized iron. All parts are nickel plated. The Horsey comes with 12 assorted patches, sandpaper and complete instructions. It is moderately priced.

SCHOOLER CLUTCH CHECK.

Operates on Hydraulic Principle and Prevents Harsh Engagement.

The O. E. Schooler Company, Webb City, Mo., is manufacturing a device termed the Schooler hydraulic clutch check. It is designed to eliminate any harsh action of the clutch, and is adaptable to both pleasure and commercial vehicles. The maker states that it works equally well with a cone or disc clutch and that, with it, it is impossible for a clutch to engage harshly.

It operates on the hydraulic principle and two adjustments make it adaptable to any type of clutch. The maker states that the Schooler device will not retard the action of the clutch, except at the actual point of engagement, and that it operates efficiently. The device weighs but 4½ pounds and is attached to the clutch pedal under the floor boards. Any experienced mechanic can install and adjust it in two hours and, after fitting, the maker states it will not require any further attention.



FEDERAL RUBBER INCREASES STOCK.

Another step of progress has been marked in the life of the Federal Rubber Manufacturing Company, Milwaukee, Wis., by the recent filing of an amendment of the articles of incorporation, whereby its capital stock has been increased from \$2,000,000 to \$3,000,000. In speaking of this action on the part of the company, B. C. Dowse, president, says: "The Federal Rubber Manufacturing Company was incorporated in May, 1911, under the laws of Wisconsin, with an authorized capital of \$1,000,000, a small working force and limited production facilities. From the start the growth of the business was very rapid, and in October, 1912, it became expedient to increase the capital stock in the amount of \$1,000,000, making the total capitalization \$2,000,000. At this time the floor space of the original plant had been increased 150 per cent., and the plant was working 24 hours each day to keep pace with the large volume of steadily increasing business.

"Now, as the result of the exceptional growth of our business during the past two years, in which time the production facilities and volume of business have increased approximately 300 per cent., we have found it necessary to again increase the capital stock \$1,000,000, consisting entirely of second preferred, making the total authorized capitalization of the company at this time \$3,000,000, two-thirds of which has been fully paid.

"The proceeds from the sale of this new stock will be applied to the construction of additional factory buildings, branch offices and other requirements of a steadily expanding business, which in less than four years has developed the Federal Rubber Manufacturing Company from a comparatively small and unknown rubber goods factory into one of the largest and best known companies in the entire rubber manufacturing industry".

NO STAMPS NEEDED FOR LICENSES.

Automobilists and state officials have been pondering of late as to whether or not revenue stamps should be affixed to motor car licenses as well as to registration cards. Francis M. Hugo, secretary of state, New York, says that the fed-

eral authorities ruled that all license certificates should bear emergency stamps to be furnished by the applicant, but his department convinced the Washington officials that these papers should be exempt because they were in the nature of official receipts and constituted merely a license which the secretary of state is obliged to issue.

MAXWELL CABRIOLET POPULAR.

The Maxwell Motor Company, Detroit, Mich., struck a winning note when it placed the 1915 cabriolet on the market. Beauty and comfort have been combined in this latest creation of the coach builders' art and, mounted on the standard Maxwell "25" chassis, it presents a perfect picture. The seat is 45 inches wide, 22 inches deep, and has a back cushion 18 inches high, upholstered with the finest leather and tufted hair.



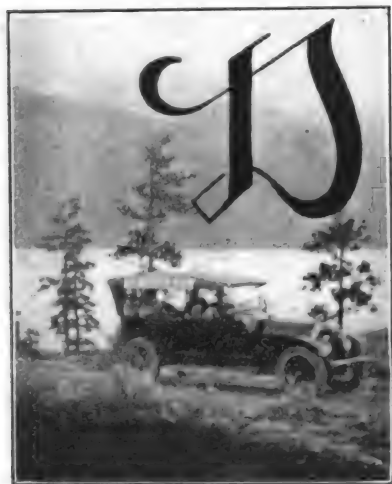
Three-Quarter Front View of the Maxwell Cabriolet Which Has Proven Its Worth for Winter Motoring.

From the front of the dash to the heel board it measures 30 inches, giving ample leg room. The height from the top of the cushion to the inside of the top of the body measures 40 inches, and the width of the doors is 25 inches. The doors are so arranged that entrance may be made from either side, and are fitted with heavy plate glass, which drops into perfectly fitting cases.

A pure streamline body, graceful crown fenders, especially designed for the car, and an interior finished in the very best broadcloth are but few of the features. The upholstery is deep and pliable, and the top is of the finest hand buffed leather. The equipment is very complete.

E. O. Hoopengartner has resigned from the Swinehart Tire & Rubber Company's New York City branch office.

ROAD CONDITIONS IN WYOMING.



WURING the past few years, according to the highway officials of the State of Wyoming, the organization for highway work there is very loose. It is added that there is no general head to supervise such work and, on account of constitutional limitations, practically all of the work has to be done by the various counties. This results in the improvement of local roads almost to the exclusion of those constituting through routes.

The legislature has designated several highways which are known as state highways. Provision is made for working state convicts on these roads under certain conditions. The state engineer is directed to locate these highways, the general route of which has been fixed by legislation. These roads are located by engineers, who are named by the state engineer and paid by the county in which the work is done, after the definite route has been agreed upon. Up to the present time, only about 10 per cent. of the mileage of these roads has been actually located, as but few counties have taken an active interest in the construction of these highways.

The convicts are worked under the general direction of the prison labor commission, which consists of the governor and certain other elective state officers, together with the warden of the penitentiary. The counties are required to provide the necessary right of way and construct all bridges, etc. This three-headed management is anything but ideal and accounts, in a large measure, for the small amount of work that has been accomplished.

The counties really have direct control of all road construction, inasmuch as they have to foot the bills for all work that is done. It is not to be expected that a county will pay for any work that it does not deem necessary. Consequently it is frequently difficult to obtain co-operation in constructing through roads. The officials of every

county are much more concerned with the construction of local roads. As over 70% of the population is classed as rural, the reason for this preference is obvious. In a few counties considerable interest has been aroused, but on account of non co-operation by adjoining counties the work done has necessarily been confined to improving local roads. It is to be hoped by those interested that the next legislature will have time to look into the matter of better road construction and will provide for some control which will insure the construction of some through routes under competent supervision.

REORGANIZE HIGHWAY BOARD.

In accordance with the recommendation of Governor Whitman in his first message to the



Grade Crossings Are Eliminated Wherever Possible in Every Part of the Country.

legislature, a bill has been introduced in New York state calling for the reorganization of the state highway department. The measure provides for a return to the Hughes system of a three-headed, bi-partisan commission, one member of which must be a civil engineer with experience in road building.

TO COVER PAUL REVERE'S RIDE.

Paul Revere's famous ride will be covered by the motorists who participate in the annual meeting of the American Automobile Association, to be held in Boston, Mass., May 17-18. A mail vote of the entire directorate almost unanimously decided for a spring meeting, instead of the regular winter event. Massachusetts is one of the

few states which have established comprehensive highway systems, and for many the journey will also include New York, New Jersey and Connecticut, all of which have arrived at a uniform method of procedure. Ohio is another state busily at work upon a main market road system, and all around it is expected that the motorists will add greatly to their road building ideas en route to the annual convention.

At the conclusion of the Boston meeting it is quite probable that a party of transcontinentalists will start for the Panama-Pacific exposition, in San Francisco. However, there will not be any organized tour, nor is it likely that all will start at the same time and follow the same schedule.

ROAD MAINTENANCE.

More and more attention is being given to maintenance cost of roads in the country every day. The recent statement of Logan Waller Page, director of the office of public roads, to the effect that \$50,000,000 is being wasted annually through lack of proper maintenance, has caused practically every good roads body in the country to take action.

The cost of highway maintenance is extensively dealt with in bulletin 136 of the Department of Agriculture. It has not been customary for officials to face frankly the cost of the maintenance and repair of bond built highways at the time the bonds are issued and before the construction begins. The experts of the department point out that, in the majority of cases where bonds have been issued by local authorities, there has been made no provision whatever for maintaining the roads when built. This is perhaps the greatest defect in the method of building highways by issuing bonds.

Maintenance is necessary in order to insure to the community the maximum economic service by the road, and also to preserve the investment. The cost of maintenance and repairs must, therefore, be studied at the outset.

The average cost for repair and maintenance of 7300 miles of highway in Connecticut, Massachusetts, New York, New Jersey and Rhode Island for the year 1912 was about \$800 a mile. A large part of this money was expended for bituminous resurfacing and bituminous surface treatment. There is some question whether the expenditure correctly measures the average cost of repairing and maintaining bituminous macadam roads. In the State of New York, however, for the years 1911 and 1912, the average cost for re-

pair and maintenance was \$724 a mile upon a total average of 2861 miles. The annual cost of repair and maintenance on Massachusetts state roads for the years 1910, 1911 and 1912 was, respectively, \$642, \$647 and \$676 a mile for about 850 miles. For the most part these figures for New York and Massachusetts represent the cost a mile of resurfacing with bituminous material and of maintaining bituminous macadam and water bound macadam roads by surface treatment with bituminous material. It is clear, therefore, that \$700 a mile is not an excessive estimate at present for the annual cost of all repair and maintenance of bituminous macadam roads.

TO MERGE GOOD ROADS INTERESTS.

The merging of national road conventions in an All-American Road Congress at San Francisco in 1915 during the exposition, was foreshadowed at the recent meeting of the directors of the American Highway Association. The board authorized a committee of two members to meet a like committee from the American Road Builders' Association, these four to choose a fifth member and thus form an executive committee to handle the great road congress.

WANTS AMERICAN CARS ABROAD.

Speaking to the Metropolitan section of the Society of Automobile Engineers, New York City, A. Ludlow Clayden, formerly editor of the *Automobile Engineer*, London, England, predicted that the finish of the European war will mean an enormous market abroad for many sorts of American made cars. Mr. Clayden recommended that the automobile builders in the United States should manufacture cars for the foreign trade.

"Literally, huge numbers of automobiles of all kinds and sizes, both pleasure type and commercial, are being consumed by the armies", said Mr. Clayden, "and will have ceased to exist absolutely by the time the war is ended. All Europe will be greatly impoverished, for it will take the work of a generation or more to pay the stupendous bills that are being piled up by each belligerent nation. Victors and vanquished alike will have to apply the whole energies of their peoples to repairing the damage to their national exchequers. Yet, when the horror of the war is past and over, there will be a general striving to get things back on the old footing of prosperity, there will be more ambition to work on the part of the peoples of Europe and a far greater freedom of action".

CORRESPONDENCE WITH THE READER.

Wiring Plans—Reader, St. Joseph, Mo.

I am taking advantage of your offer to supply information. Please explain series and parallel wiring of cells and lamps.

Dry cells are wired in series, as shown at Fig. 1 A, to obtain voltage. Assuming that the volt-

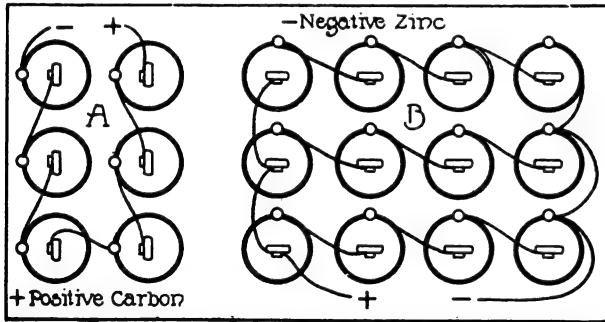


Fig. 1—Illustrating Series and Multiple Series Wiring of Dry Cells.

age of each cell is one, by wiring the negative and positive terminals alternately, or in series, the sum of the voltage will be six. This method does not increase the amperage, which remains the same as that of one cell, 18, for example.

The sketch at B illustrates wiring the cells in multiple series. As may be noted there are three rows of four cells and each row is wired in series. This arrangement leaves exposed the negative terminals on the right hand side of the group and the positive on the left. The free negatives are connected together, as are the positives.

Wiring in multiple is employed to obtain greater life from the batteries, it being stated that considerably more service will be secured with the cells grouped in this manner. It increases the amperage, but not the voltage. The voltage of the one group wired in series is the sum total of all the cells. Thus if 24 cells were wired in multiple, or in groups of six in series, and assuming that the voltage of each cell is one, the total voltage obtained would be six.

The wiring plan of electric bulbs in series is shown at Fig. 2 A, and, in multiple, at B. The former method is practically the same as wiring dry cells in series in that the connections are made in such manner that the current flows from the positive (+) terminal of the battery through the filament of the first lamp, thence to the second bulb and so on back to the battery, completing the circuit.

The lamps may be compared to switches in a circuit in that each closes the circuit, providing a path for the electricity. If, however, a filament

burns out, it breaks the circuit. For example: Assuming that the first and last lamp are the dash and tail light members in the lighting circuit of a car; upon the filament of the last lamp burning out or breaking, the current will not flow because of the fact that, for electricity to flow from a battery, a path must be provided for its return, that is, from the positive to the negative pole.

The drawing at B shows parallel or multiple wiring. As may be noted, all of the positive terminals of the bulbs are connected to each other through one wire, and the negative wire attached to the negative terminals of the lamps. With such an arrangement the burning of a filament will not interfere with the utility of the other lamps, as a path is provided for the current to flow through the other filaments. Under these conditions it would be possible to obtain service from one lamp when two are broken.

Cylinder Misses—Subscriber, Olin, Ia.

I have a model 25 Buick, 1913. It has a four-cylinder motor and the ignition is by a Splitdorf magneto. The carburetor is a Marvel. The second cylinder misses when the motor is running slow, but fires when speeded up. I have had it to a good repair man, but he has not remedied the trouble. All four cylinders have good compression. Can you make any suggestion as to the cause of the trouble?

If the repair man has gone over the motor, ignition, etc., thoroughly, and has failed to locate the trouble, it must be very baffling. There are a number of causes for missing at low speeds, such as an imperfect spark plug, too wide a gap of the points, a leak in the secondary wire leading from the distributor on the magneto to the plug, a weak valve spring, leakage of air, sticking valve stem, valve not seating properly, etc. The fact

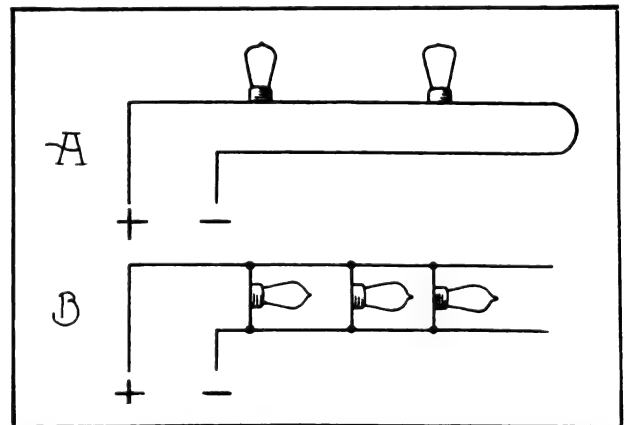


Fig. 2—Wiring Lamps: A, Series; B, Parallel or Multiple.

that the trouble is confined to a single cylinder indicates an ignition fault. Operate the motor slowly in the dark and note if the high-tension current jumps from the cable to any nearby metal.

G. P. O. Spring—Reader, Billerica, Mass.

In the Jan. 10 issue of The Automobile Journal you published a description and illustration of the G. P. O. supplementary spring being made in England. Can you inform me who makes or sells it in this country, as I would like to see the device, as I think well of it?

As far as can be ascertained the spring referred to is only made and marketed abroad. The address and name of the maker will be supplied if desired.

Mileage Reduced—E. B., Anderson, Ind.

I own and operate a 1914 Metz car. Usually it takes $3\frac{1}{2}$ gallons of gasoline to run from Hamilton, O., to Anderson, Ind., about 100 miles. The last trip I made I used 14 gallons. I know nothing about carburetors and wish to find out what the trouble is and how I can remedy it. Can you advise me in the matter?

Generally, such a difference existing is due to a leak in the fuel system, such as the tank or some of the connections. If a carburetor floods excessively, there will be a noticeable difference in the mileage obtained. In both cases an examination will show the fault.

If an intake valve seats poorly, considerably more fuel will be required to negotiate a given distance than would be the case if the valve closed properly. Under such a condition the throttle will be opened more than usual, and the motor will not develop its customary power. Considerably more fuel will be burned under these conditions.

Gasoline—Subscriber, Onawa, Ia.

Will you kindly answer the following questions in your correspondence department?

Which obtains more power, a high-test gasoline, 68 or 70, or the low-test, 60?

Which would be the more economical to use at two cents difference in price a gallon?

What is the difference between the Delco and the Atwater Kent systems of ignition?

It is stated that more power is obtained by the use of a low-test gasoline than with the more volatile, as there are more heat units obtained.

As to the economy of different fuels mentioned, a practical method of determining which is best would be to operate car on a measured gallon of each fuel, driving the machine over the same course and noting the mileage obtained. The results obtained could be utilized to figure the economy above referred to.

The Delco and Atwater Kent systems of ignition differ in that the former is a unit with the motor-generator and, when starting, the current

is supplied by the battery, and afterwards by the dynamo; that is, generally speaking, as the Delco system is produced in various forms to meet the requirements of the individual motor vehicle manufacturer.

In the Atwater Kent system the current supply is obtained from either dry cells or a storage battery, and the 1915 system provides for automatically advancing the spark or, in other words, the spark is advanced proportionately to the speed of the motor. In both systems the mechanism for interrupting the primary current and distributing the intensified electricity is incorporated in one housing.

Left Hand Drive—T. S. T., Reading, Penn.

Which is better, the right or left hand drive, and what is the advantage of either over the other?

Owing to the traffic regulations in the cities, which in most cases require that automobiles shall draw up to the sidewalk on the right hand side, considered from the direction in which they are headed, and also because of the usual rules of the road as to turning and passing, the left hand drive, which enables the operator to leave his car on the right, and thus step directly on to the walk, and which also gives him a better view of approaching vehicles when driving, is considered better and is being adopted by many manufacturers. Aside from these reasons, there is probably no choice.

Best Speed to Drive—H. E. L., Portland, Me.

What is the best speed at which to drive my 30-horsepower car over good roads where there are not many hills?

The speed at which a car should be driven depends mostly upon the inclination of the driver, as speeds of from 15 to 40 miles or even more have no particular difference in the effect on the mechanism. There is, however, some speed at which the greatest possible mileage a gallon of gasoline will be given, but as this depends upon the normal speed of the motor, the gear ratios, etc., it is impossible to answer the question in more than a general way.

Inner Tube Trouble—Reader, Waterbury, Conn.

What causes an inner tube, a brand new one, not run over 15 miles, to blow out and rip it for a distance of eight inches from the valve stem? Is it because the tube was defective or what?

The fact that the tube blew out and the split extended from the valve stem indicates that it crept in service. This was doubtless caused by not screwing up snugly the threaded member locking the valve in position in the rim.

UNUSUAL SERVICE BY MAXWELL COMPANY.

ONE of the obligations assumed by the motor vehicle manufacturer is to carry spare parts for his product and to supply them promptly

approximately 800 shipments to be made daily.

When the Maxwell Motor Company took over the Newcastle plant there were 3000 unfilled orders and over 2000 unanswered letters from owners and the trade. Within 90 days after, all orders were shipped. One of the features of the service is that a small order receives the same attention as a large one. Manager J. E. Burns states that it is rare that an order cannot be promptly shipped, and when such occurs the purchaser is advised by a special letter and an approximate date of shipment is given.



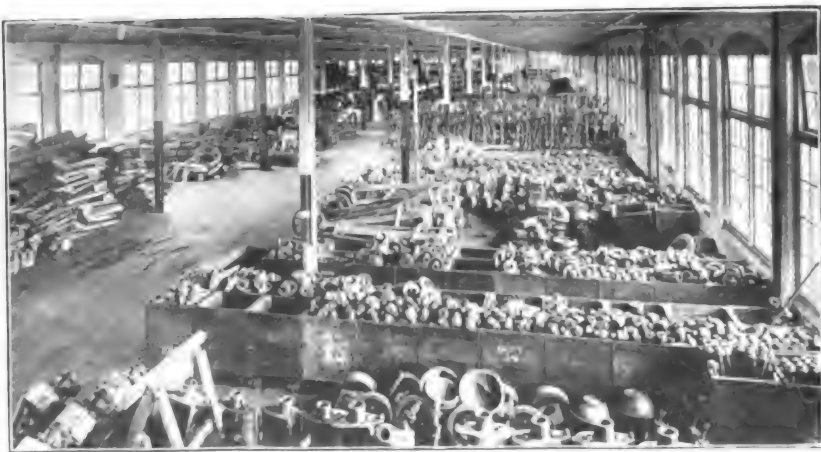
Showing a Section of the Maxwell Motor Company's Service Plant at Newcastle, Ind., Where Orders for Any Part of Cars Made by United States Motor Company Are Promptly Filled.

upon demand. An unusual service, in that it affords the motorist and dealer opportunity to obtain any component, is that maintained by the Maxwell Motor Company, Inc., Detroit, which concern will supply any part for the Maxwell-Briscoe, Stoddard-Dayton, Brush, Everitt, Columbia and Courier pleasure cars, and the Alden Sampson commercial vehicle. The service is such that all orders are filled and shipped to their destination within 24 hours after their receipt.

The Maxwell Motor Company maintains a big three-story factory at Newcastle, Ind., which plant was purchased from the receivers of the United States Motor Company. The purchase was made with a view to give prompt service to the owners of the cars made by the defunct concern, and some idea of the number of these in operation may be obtained by the volume of business transacted during the fiscal year ending Aug. 1, 1914. During that time 1250 tons of material were shipped by express, 3000 tons by freight and 55 tons by parcel post. During the year above referred to 246,000 individual orders were filled, this giving an average of

In addition, \$250,000 worth is carried at the San Francisco, Cal., service branch for western customers.

Storage for this immense stock requires the entire floor space in the three-story building of the Newcastle plant. This structure is 722 feet long, 60 wide and contains over 49,000 part bins. There is row after row of specially constructed racks for fenders, radiators, wheels, etc. The company is issuing to the trade only a 416-page master price book. It is divided into sections, each part covering all models of one make.



Some of the Material for Maxwell-Briscoe, Stoddard-Dayton, Columbia, Brush, Everitt, Etc., Cars Carried in Stock at the Newcastle Plant.

FORD MAKES MEN OUT OF CONVICTS.

TESTIFYING before the United States commission on industrial relations, in the Aldermanic Chamber, New York City, Henry Ford, president of the Ford Motor Company, Detroit, Mich., declared that he makes men out of convicts. This commission has been investigating the conditions and causes of the increased number of non-workers, and Mr. Ford followed August Belmont, Jacob H. Schiff, Samuel Gompers, George W. Perkins and a host of other leading financial and labor lights of the country.

"Among the workers in our factories we have a great many who have been in prison and who are outcasts from society", said the head of the Ford Company in the course of his testimony. "Every one of them is making a good showing and is gaining in self-respect and strength of character. We will guarantee to take every convict out of Sing Sing and make a man of him.

"No man can bring up a family and hope to own a home on the ordinary rates of wages. I do not think that any man can do good work mentally and physically for more than eight hours a day. Theoretically, some persons may argue that we have no right to inquire how a man lives at home, so long as he does his work at the factory; but we are talking of conditions, not of theories.

"If corporations are over-capitalized they must necessarily oppress labor to make a showing. But if they grow from small beginnings naturally and stick to one legitimate product, balanced conditions are bound to follow. The sooner men can be taught that labor is just as much of an asset, and more, than machinery and buildings, the sooner labor will be properly recognized. In my judgment mere bigness is no objection if corporations are not over-capitalized. I have very little use for charities or philanthropies as such. My idea is, aid men to help themselves. Nearly all are willing to work for adequate reward".

Mr. Ford described the profit sharing plan of his company, under which every man over 22 years old in his employ receives a minimum wage of \$5 a day, and under which those under 22, and women who have others dependent upon them, also get that wage. There is a universal work day of eight hours. Wages are paid according to skill and skill is sub-divided into degrees of skill.

In reply to questions, Mr. Ford stated that

the \$2,000,000 capitalization of the Ford Company was owned by eight men. During the last year, he said, the company did between \$80,000,000 and \$90,000,000 of gross business, and the profits were \$25,000,000. Summing up the story of his profit sharing scheme, the Ford president said: "Our first purpose was substantial justice to our co-workers, without whom we could have accomplished nothing. We do not regard it as in any sense a gift or a charity, but only due reward for service".

NEW STATE ASSOCIATION.

At a meeting held in the offices of the American Automobile Association, New York City, the organization of the New York State Motor Federation was perfected. The new body was suggested on Dec. 19 at Rochester, N. Y., owing to the dissatisfaction on the part of the automobile clubs of Buffalo, Rochester, Syracuse and Utica with the policies of the old New York State Automobile Association. The new organization has a membership of 11,000, which makes it now larger than the N. T. S. A. A.

The following officers have been elected: John M. Ross, Utica, president; Rudolph Schmidt, Rochester, first vice president; B. E. Watson, Syracuse, second vice president; George C. Donohue, Utica, secretary, and Maurice M. Wall, Buffalo, treasurer.

CABRIOLET A POPULAR BODY.

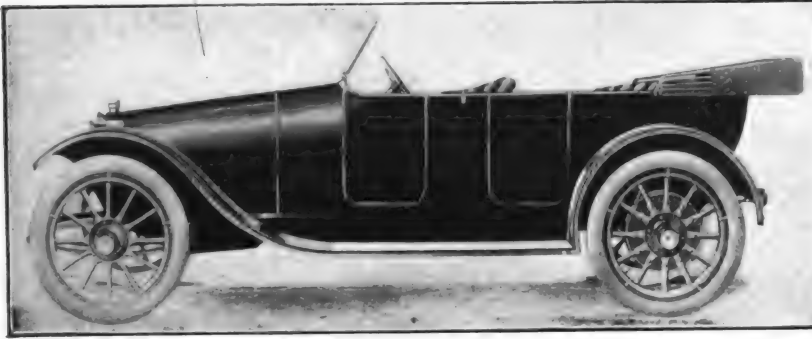
That the many advantages of the cabriolet body, which practically makes two cars out of one, the folding top giving all the advantages of a closed body when in use, but entirely out of the way when folded down, will make its adoption by a majority of car owners only a matter of time, is the opinion of C. A. Emise, vice president and sales manager of the Chandler Motor Car Company, Cleveland, O. Mr. Emise calls attention to the increase in winter driving, and the consequent demand for closed bodies, notwithstanding the fact that the open car is preferable in summer.

The Allen County Automobile Association (Indiana) has been organized to bring about the passage of laws that will be more in the interest of automobile owners.

REMINGTON ANNOUNCES EIGHT-CYLINDER CAR.

ONE of the most recent surprises in the automobile world was the announcement of the Remington Greyhound eight-cylinder car,

connecting rod bearings are $1\frac{1}{8}$ by $2\frac{3}{8}$ -inch, and the connecting rods are of the scissor design, high-carbon, and heat treated forging. The clutch is of the dry disc type, having 13 plates, the alternate plates being faced with Raybestos. As to the bearings used elsewhere it may be added that Timken roller bearings are used in the front wheels, Schaefer imported annular bearings in the rear wheels, F. & S. for the transmission, and Timken long series for the differential.



The New Remington Greyhound Eight-Cylinder Model, Showing Perfect Streamline Body Design.

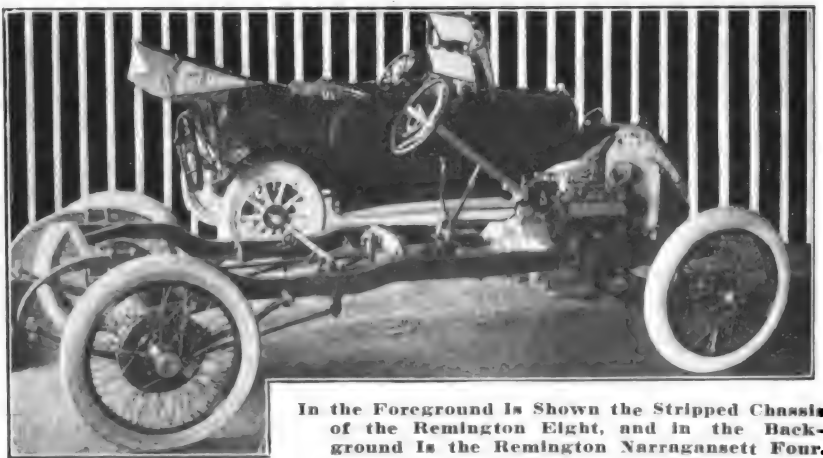
which attracted large audiences in both New York and Chicago during show weeks. This car, made by the Remington Motor Company, 2 Columbus circle, New York City, is produced with either a two, four or six-passenger body, and the price is the same for all three models. The Remington Company is still marketing its four-cylinder Narragansett model, which sells for less than \$700 fully equipped with electric starting and lighting, automatic gearshift, electric horn and demountable rims.

Aside from the price, the feature of the Remington eight is, of course, the motor. This is of a V shape, the two blocks of four cylinders being set at an angle of 90 degrees to each other, and the bore of $3\frac{1}{8}$ inches and stroke of $4\frac{1}{2}$ gives it a horsepower rating of 31.20, S. A. E. formula. However, the company's engineers say that 45 horsepower has been developed on brake test. The motor is water cooled, a centrifugal pump being employed, which is driven by silent chains. A cellular radiator assists in the cooling, and the lubrication is by constant level splash and force feed by a ball plunger pump. The ignition is by the Atwater Kent system, and carburetor is a Zenith.

Going into detail, it is seen that the front crankshaft bearings are $1\frac{1}{8}$ by $2\frac{3}{32}$ -inch, and the rear crankshaft bearings are $1\frac{3}{4}$ by $4\frac{1}{2}$. The

The starting and lighting are supplied by the Gray & Davis system, and all lamps are lighted direct from the generator. When the motor is not running the current is supplied by an automatic storage battery. The front axle is of I beam section, drop forged, and the rear axle is of a special design, full floating type, with nickel steel gears and shafts. The housing is arranged so that the outer shell and annular shells supporting the differential bearings form a truss, holding the gears in perfect alignment. The springs are underslung, being semi-elliptic in front and three-quarter in the rear.

The frame is of pressed steel channel section, with a double drop under the tonneau doors. A large spring suspended torque truss takes the



In the Foreground Is Shown the Stripped Chassis of the Remington Eight, and in the Background Is the Remington Narragansett Four.

thrust at the rear axle, and the drive is through ball socket radius rods direct to the side members of the frame. The transmission is of the selec-

tive sliding gear type, having three speeds forward and reverse. The steering gear is of the worm and sector design, irreversible, having an 18-inch ebonized steering wheel. The wheelbase of the new eight is 116 inches, and 35 by 4½-inch tires are fitted on demountable rims. A set of five wire wheels is furnished for \$100 additional.

The specifications of the Remington Narragansett four-cylinder model are practically the same as printed in these columns a short time ago. The body design for both the eight and the four is exceptionally clean cut, a straight line being carried from the radiator to the cowl, and back to the snug fitting hood. The doors are flush, and with the concealed handles, absence of side lamps and long, gracefully curved guards and clear running boards, the car presents an appearance that is distinctive in many respects.

The motor of the four is cast en bloc, water cooled by the thermo-syphon system, and the bore is 3⅛ inches and the stroke four. All the valves are located on the right side and fully enclosed. The carburetor is supplied by gravity from a 10-gallon gasoline tank carried in the cowl. The transmission has three speeds forward and reverse, and is operated by the Remington automatic gearshift. All gears are nickel steel, being mounted on Hyatt high-duty roller bearings. The ignition is supplied by the Atwater Kent system, and this is equipped with an automatic advance.

As in the case of the eight, the equipment is complete in every respect, including top, windshield, speedometer, electric horn, etc. The wheelbase of the four is 106, and the demountable rims are fitted with 30 by 3½-inch tires. The weight of the four touring model is 1500 pounds, and that of the roadster is 1350.

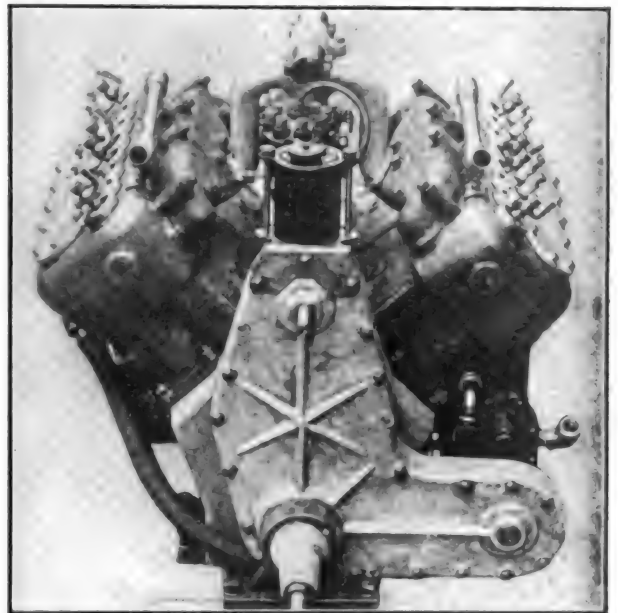
GOODYEAR SOLVES TRUCK PROBLEM.

In its present campaign for the S-V truck tire, the experts of the Goodyear Tire and Rubber Company, Akron, O., believe they have solved a problem that will help mightily in the development of the whole motor truck industry. "Our offering is the result of eight years of research experiment and the hardest tests to which we could submit tires", says C. W. Martin, Jr., manager of the motor truck tire department of the Goodyear Company. "The story to us in the heart of it is fascinating. To solve certain problems Goodyear experimental experts have built 29 different types of truck tires. In one type alone 74 different structures were built

up and tried before we were satisfied as to the point we were interested in.

"All of our experiences have led to the present offering—the S-V truck tire for heavy service. We have been trying them under every conceivable condition for a year and a half. Twenty-one hundred of these tires have been working, developing mileage and giving satisfaction, in every part of the country. Now we are satisfied and we offer it to the public.

"The S-V is a pressed-on tire and, while it has the utmost security, there is no tire more easily applied. There are no rights and lefts and it cannot be put on wrong. It is simplicity itself, weighs less because of the absence of loose parts and attachments—and, best of all, it delivers the



The Remington Greyhound Eight Motor, Which Caused Favorable Comment at the Recent Shows.

goods—giving greater mileage at lower cost than any tire we have ever seen. S-V tires keep the truck in commission, and our experience thus far makes it certain that they will have remarkable popularity and success".

The annual report of the Ford Motor Company, Ltd., Walkerville, Ont., shows a profit of 200 per cent. on the capital stock for the fiscal year ending Oct. 31, 1914. The company is capitalized at \$1,000,000, and the profits for the year amounted to \$2,022,496, of which \$1,924,747 was earned at the Walkerville branch, and the balance, \$97,749, at the branches in Toronto, Montreal and London.

IN THE COMMERCIAL VEHICLE FIELD.

KisselKar Chassis Doing Excellent Work Drawing Trailer in Fire Department Service —Street Railway Interests Opposed to Jitney 'Buses—New Packard Line.

A FEW years hence will see the passing of the horse entirely from the fire departments in every city in the United States. It is stated by Robert Adamson, fire commissioner of New York City, that the end of 1917 will see the last of the horses in that city. This is true of every town and city no matter what the size, and an examination of the work being done by the motorized apparatus indicates that the change is well made. It is interesting to note the excellent service being afforded by the KisselKar truck at Patchogue, Long Island. This vehicle, made by the Kissel Motor Car Company, Hartford, Wis., consists of a 1½-ton Kissel truck chassis, on

and pistons are bored, ground and lapped in special lapping machines, so that each part is exactly fitted to the part with which it belongs. The lubrication is by pump and splash; the ignition is by a Bosch high-tension or Mea magneto, and the cooling is by a positive circulating system actuated by a centrifugal pump fastened to the same shaft that operates the magneto.

NEW COMMERCE TRUCK.

The Commerce Motor Car Company, Detroit, Mich., has announced a new model 1500-pound motor wagon with a three-speed transmission and shaft drive. A Continental L head, bloc motor, with 3½-inch bore and five-inch stroke, Eisemann ignition, thermo-syphon cooling and combined force feed and splash lubrication, are used. The wheel base is 107 inches and the steering by worm and nut, with the wheel on the right and the control levers in the centre. Pneumatic tires, 33 by four, are used,



The KisselKar Fire Truck and Trailer, Which Is Doing Excellent Work in the Patchogue, Long Island, Fire Department.

which is mounted a patented fifth or oscillating wheel. This tractor may be attached to any style of horse drawn vehicle, and in this particular case the Patchogue department has applied it to a hook and ladder trailer.

The fire company reports that the most excellent service is being rendered by this combination, and the efficiency of the outfit has materially reduced the fire loss in that vicinity. The chassis of the KisselKar fire truck is designed and built entirely in one factory. The motor, a four-cylinder, four-cycle, water cooled, L head type, with cylinders cast in pairs, is of standard design. The valves are all placed on one side and operate on a single camshaft. The cylinders

with quick detachable rims. The equipment includes a windshield, tools and lamps.

JITNEY 'BUSES CAUSE TROUBLE.

The transportation world has been aroused by the advent of the jitney 'bus. Throughout the West and Southwest these 'buses have had a wonderful growth, and already the legislatures, councils and other bodies are being petitioned to take a hand to stay the jitney 'bus. The name is derived from the fact that a jitney in the language of the West means five cents, and these 'buses will carry passengers for that sum. Hence the street cars and other modes of transporta-

tion are having broad inroads made on their earnings.

In San Francisco, Cal., the jitney men have formed an association of 139 members, representing more than 200 jitneys, and it is stated that this list takes in but a small part of the total represented in this field. In California the total jitneys in service today is placed at approximately 1000. Fords and Maxwells predominate in the jitney service, and all makes of light cars are being used.

In Texas the street railway interests are about to appeal to the legislature for relief from the terrific cuts in revenue by the jitneys in that state. An effort will be made to secure the enactment of a law prohibiting the operation of competing lines of transportation upon streets in which electric car lines already have franchises. It is thought questionable whether municipal governments have authority to pass such an ordinance, and for that reason a state law governing the subject is proposed. An official of the Houston Electric Company states that the advent of the jitney has reduced its earnings by more than \$1000 a day.

That the jitney can carry passengers at a profit for five cents is agreed to by all the 'bus proprietors. Full provision for time, investment and depreciation is allowed for, all of which is stated to be six cents a mile.

HUPMOBILE DELIVERY UNCHANGED.

The 1915 Hupmobile light delivery car, made by the Hupp Motor Car Company, Detroit, Mich., remains practically the same as the 1914 model. The chassis is identical to last year's 32 chassis, and the Hupmobile body is a standard design especially made for package delivery.

TRACTOR CUTS COSTS IN HALF.

A saving of from 50 to 100 per cent. by the use of a Knox-Martin tractor is being made by this machine for the J. A. Budlong & Son Co.

Cranston, R. I. This concern is one of the largest intensive farmers in New England, and has more than 1000 acres within the city of Cranston, of which more than 700 are cultivated. The Knox-Martin tractor, made by the Knox Motors Company, Springfield, Mass., was delivered to the Budlong Company March 5, 1913, and up to Oct. 1, 1914, the cost of repair work, tires, insurance, oil, gasoline, etc., was from one-half to 100 per cent. under the cost of the four pairs of horses, four carts and four drivers that it replaced.

MAKING TRACTOR AND DELIVERY CAR.

The Homer Motors Company, Los Angeles, Cal., is now manufacturing a motor tractor weighing four tons and a light delivery car with a capacity of 1000 pounds. The company is



Showing Side Gates Open on the Knox-Martin Six-Ton Tractor and Nine-Ton Trailer, Used by J. A. Budlong & Son Company, Cranston, R. I.

financed entirely by Los Angeles capital and is under the management of J. E. Meyer, president; Dr. J. E. Cowles, vice president; George W. Bishop, secretary, and George F. Thompson, treasurer. J. P. Barker, the inventor, and David Macdonald are directors, together with the above-mentioned gentlemen.

KISSELKAR ADDS WORM DRIVE.

For 1915 the Kissel Motor Car Company, Hartford, Wis., is adding two new worm driven models to the KisselKar truck line. These are of 1500 and 2000-pound capacities. The Kissel Company is working on a 1000-pound worm drive model, the details of which are not yet ready to be announced.

STANDARD TRUCK AGENTS.

The Standard Motor Truck Sales Company, Cleveland, O., a new firm, has been formed to take over the sale of Standard trucks in that city. The officers are: Emil Petersilge, president, treasurer and general manager; Arthur Petersilge, vice president, and T. L. Petersilge, secretary.

At the same time announcement is made that a drawback allowance on the exportation of motor trucks and parts manufactured by the Standard Motor Truck Company, Detroit, Mich., has been granted by the United States treasury department.

REPUBLIC TRUCK MAKES PROGRESS.

The Republic Motor Truck Company, Alma, Mich., has increased its capital stock from \$50,000 to \$250,000. This concern was organized in July, 1913, under the name of the Alma Motor Truck Company, and its original capital was \$15,000. At the present time the company is turning out on an average 12 trucks a day, and with the new capital this figure is expected to be greatly increased.

SIX FIRE TRUCKS ORDERED.

The New York Board of Fire Underwriters, New York City, at a recent special meeting, voted the sum of \$12,000 for the purchase of six automobile trucks. These will be used for the various purposes of the fire patrol in the 42nd street houses. This will enable the patrol to keep pace with the fire department, which has improved its service by installing new motor equipment in this territory.

NEW PACKARD LINE OFFERED.

An entirely new line of Packard trucks is being offered for 1915 by the Packard Motor Car Company, Detroit, Mich. For the first time in the history of the company the trucks have left steer and centre control, and the worm drive is used instead of the chain. A one-ton truck has also been added to the line, and there are also two, three, four, five and six-ton models.

TO MANUFACTURE LIGHT TRACTOR.

The Utility Steel Tractor Company, Antigo, Wis., is preparing to market a light four-wheel drive tractor. This concern was recently organ-

ized with \$25,000 capital, and is negotiating with several commercial associations in Wisconsin and Illinois for a site for the foundry and machine shop group it intends to erect during the current year.

ARMY TRUCK BILL PASSED.

The army appropriation bill, carrying \$101,000,000, has been passed by the House of Representatives at Washington, D. C. This bill carries funds for the maintenance of all branches of the army during the coming year, and \$50,000 is included for the purchase of armored motor cars.

CHICAGO FENDER TEST.

The tests made on motor truck fenders in Chicago, Ill., failed to bring forth a type that was considered successful. The city intends to conduct further tests on various makes of fenders and hopes by March 1 to have determined upon an approved type or types.

NEW TEXAS 'BUS COMPANY.

The Motor 'Bus Company, El Paso, Texas, has been formed with a capitalization of \$2500. The incorporators are: John J. McCourt, J. W. Kirkpatrick and James V. Robins.

WANT MORE SAFETY ZONES.

Frederick H. Elliott, secretary of the Safety First Society, New York City, has suggested to Mayor Mitchell's safety committee that New York have isles of safety, safety zones for car stops, restraint of pedestrians at street intersections and an increase in the number of one-way traffic streets.

STUDEBAKER'S PRIZE CONTEST.

The Studebaker Corporation, Detroit, Mich., has offered prizes to its salesmen for the best essay on "How to Sell a Studebaker Car". To date there are some 1000 salesmen in the competition and it is predicted that there will be three times that number before the lists close.

IOWA FEES TOTAL \$1,025,000.

For the calendar year ended Dec. 31, the automobilists of Iowa turned \$1,025,000 into the state treasury in license fees. There were 106,000 cars registered during the full year period.

STARTING AND LIGHTING SYSTEMS.

"The most important feature of a starting and lighting system for motor cars is the method of charging the battery", states the Ward Leonard Electric Company, Bronxville, N. Y. "If the battery is kept in perfect condition and always fully charged, the starting and lighting are almost certain to be satisfactory. But if the method of controlling the charging of the battery is imperfect the starting and lighting are sure to be imperfect.

"The method of battery charging which in the very recent past seems to have made, as patent lawyers say, a 'conquest of the market', is the method in which the battery charging current causes the rapid vibration of a light vibratory switch whose rate of vibration is automatically controlled and whose automatic vibration automatically causes the battery charging current to control itself so as to keep the battery in perfect condition regardless of the engine speed or other changing conditions.

"Before this simple, reliable and inexpensive method of control was devised, there were scores of other methods used and tens of thousands of the older forms will have to be eventually replaced by the modern controller which, fortunately, is quite inexpensive.

"It now appears by a patent which was issued upon Dec. 29, 1914, that the original inventor of this vibratory controller for the battery current was H. Ward Leonard of Bronxville, N. Y. This patent, which has been pending in the patent office for many years, seems to broadly cover the method of battery charging which is now to be found on nearly all of the cars of this year's type".

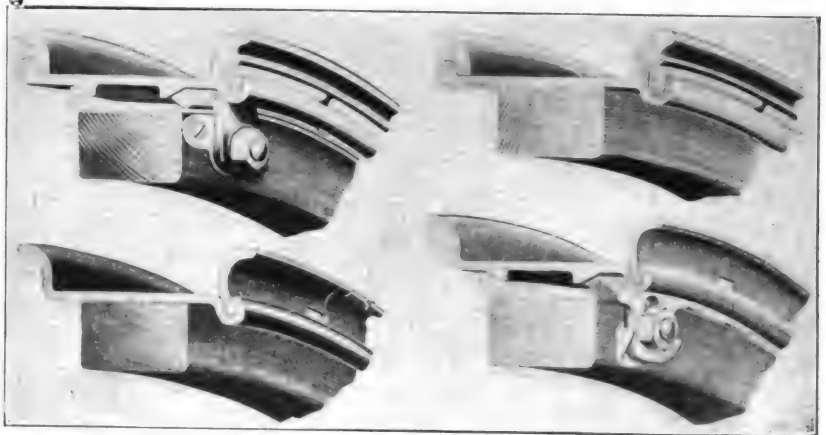
MOTORISTS MAY RAISE \$500,000.

The New York state committee of mercy, New York City, has started a movement to raise a separate relief fund from automobile licenses of the city and state. Frederick H. Allen, chairman of the finance committee, points out that if every owner denies himself one Sunday's trip it will mean the receipt of an enormous revenue. It is figured that at least \$500,000 could be raised from the 100,000 licensees in New York before

the middle of the current year. As there are 54,234 cars in Greater New York alone, it will be seen the city will contribute over half of this.

GOODYEAR 1915 RIMS.

For 1915 the Goodyear Company is featuring its two-piece rim. The campaign has already resulted in contracts with 14 leading car manufacturers for Goodyear rims as standard equipment, and at this time the company is placing its proposition before dealers in an attractive form. The Goodyear experts claim for the Goodyear detachable rim and the Goodyear detachable demountable rim, that they are the simplest and safest possible for their purpose. It is claimed that the rims take the "grief" out of tire changing, that Goodyear rims cannot stick or balk against removal or application, that they have a wide base, increasing the air capacities of the



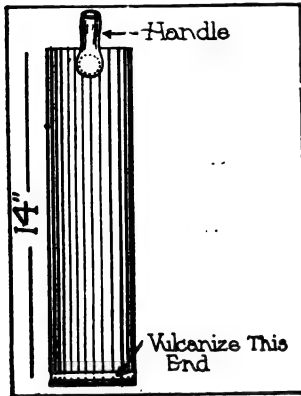
Illustrating the 1915 Goodyear Rims: Upper Left, Ideal Detachable Demountable for Heavy Cars; Upper Right, Ideal Detachable for Heavy Machines; Lower Left, Section of Detachable; Lower Right, Detachable Demountable.

tires used on them, and that the rim is the lightest on the market that includes the detachable feature.

The rim has a solid base, so that it does not pinch the tubes or permit squeaking, and water and dirt cannot penetrate. Agencies for Goodyear rims are now being established in all parts of the country and, because of the many calls dealers have for detachable and demountable rims of the straight side type, a fine business is predicted. For heavy cars, such as the Packard, Pierce-Arrow, etc., the Goodyear Company is making a special rim in larger sizes for which many advantages are claimed. These are known as Goodyear Ideal rims, detachable and demountable, and their tops fit the demountable fastenings with which the cars are already equipped.

MECHANICAL NOTES FOR OWNERS.

A SUGGESTION for making a water bucket, one that will serve for a number of useful purposes, is contributed by Hugh G.



Home Made Water Bucket,
Constructed from Section
of Inner Tube.

ing. A section that is in good condition is selected, and a piece cut out from 14 to 20 inches. The cuts should be made true and a pair of heavy shears can be employed. If the shears be wet the work of cutting will be facilitated.

One end of the bucket is closed by vulcanizing, and this work can be performed with one of the portable types, such as are made for motorists, or the tube can be taken to the expert. The cost of vulcanizing should not be expensive.

The bucket is completed by cementing a handle to the open end as shown, or the handle may be dispensed with, but it will prove serviceable. If the vulcanizing is done properly, the bucket may be rolled into a very compact parcel. Mr. Knapp states that he has found the bucket extremely useful, particularly when the supply of water in the radiator needs replenishing, especially when touring.

The editor of this department will be pleased to receive suggestions from the Journal's readers for making equipment or devices, and when possible the data should be accompanied by a sketch. An outline of the device will suffice, as it will be redrawn by the artists. Contributions suggesting methods for simplifying adjustments or repair work will be appreciated.

FITTING OIL GAUGE.

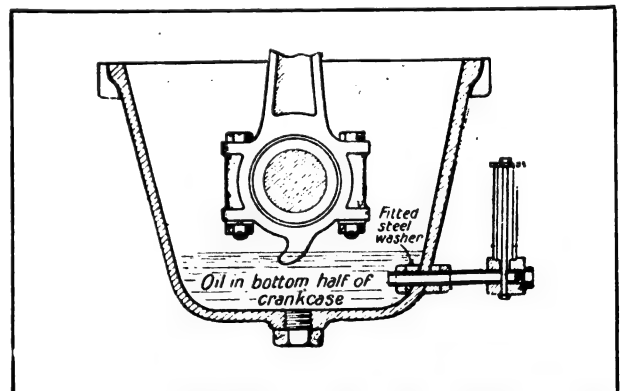
A number of old machines have motors which are lubricated by the simple splash system. Some

engines are not equipped with means for renewing the supply of lubricants in the crank case except by hand, and the working parts are either flooded or starved of oil. There is more or less guess work with this method, and usually it results in a waste of oil.

A suggestion for equipping an old motor with a gauge appeared in a recent issue of the Commercial Motor, and the method is shown in an accompanying illustration. The material is not expensive and the work can be performed by one handy with tools, or some of the parts can be made at the machine shop at a slight cost.

The first step is to ascertain what should be the proper location of the gauge in the crank case, and it should be a simple matter to note the correct level of the oil and mark the height on the outside of the crank case with a prick punch. This mark is then drilled and the opening slightly enlarged to take a piece of $\frac{3}{8}$ -inch gas pipe. Another method would be to tap the hole and cut a thread on the end of the pipe, then screw the last-named member into the crank case. In the drawing showing the arrangement of the parts the pipe is retained in place by two tapered washers and lock nuts, and if desired these could be employed with the threaded pipe.

The most difficult part of the work for the owner is the making of the block which supports the glass gauge and into which the pipe is threaded. The block is made by taking a piece of one-inch square steel, and drilling a hole to take the pipe. It will be noted that this hole is carried through the block and that the free end is



Illustrating Construction of Oil Gauge Fitted to Crank Case of an Old Motor, and Employed for Indicating the Height of the Lubricant in the Crank Case.

closed by means of a plug. This plug permits of draining the gauge.

A $\frac{7}{16}$ -inch hole is drilled in the top of the

plug and the opening is recessed slightly, $\frac{5}{8}$ -inch in diameter, for the glass tube to fit into. Two oil proof washers are cut, one to fit the opening in the block and the other the top of the tube. In making these washers, the bottom one must have an opening sufficiently large to permit the oil flowing into the gauge.

The glass tube is held in place by a $\frac{3}{16}$ -inch threaded bolt, which passes through the tube and block. A metal washer at the top of the tube provides a bearing for the bolt. The correct height for the lubricant is marked on the glass tube.

CARE OF SPARK PLUGS.

Owners who make it a practise to disassemble the spark plug when it requires cleaning, should exercise care in the reassembly of the parts, particularly in adjusting the hex nut that compresses the washer utilized for sealing the space between the porcelain and the shell. The nut should be screwed up snugly, but if it be too tight the porcelain is likely to crack when exposed to considerable heat.

After replacing the plug in the cylinder it is a good plan to test it for possible leaks. Start the motor, then take an oil can and apply the lubricant between the hex nut above referred to and the porcelain. Any leak will be noted by the bubbles given off. If the plug leaks, it should be disassembled and the washer examined. It may be that the material has become so hardened that it will not effectually seal the opening.

When testing for leaks, the oil should be applied to the threads of the shell to see if the plug is screwed up tight in the valve cap. Before replacing the plugs it is a good plan to smear the threads with a mixture of graphite and oil, or to moisten the threads with oil, then dust them with powdered graphite. This will make it an easy matter to remove the plugs when desired.

TESTING VALVE SPRINGS.

After a motor has seen considerable service, especially one of the early types, the exhaust valve springs are likely to lose their tension, causing erratic operation at very low speeds. If the springs be very weak there will be a tendency of the valve to lift on the intake stroke, and at high speeds the valve may fail to close quickly enough. If a spring be suspected of causing erratic operation, it may be tested by inserting the blade of screw driver or a similar shaped tool

between the coils of the spring with the motor operating. This will increase the tension and indicate if the spring be at fault. It is cheaper in the end to fit new springs than to attempt to remedy the old members.

GRAPHITE THE RIMS.

From time to time attention has been called to the importance of properly caring for the rims. At this season of the year when the roads are covered with snow, ice and slush, the water finds its way between the beads of the tires and the rims and, if the last-named members are not kept coated with a moisture resisting preparation, rust will form. This applies to all types of rims, detachable and demountable.

Remove the tires occasionally, clean them and the rims, and apply a mixture of powdered graphite and oil to the rims. Make a very thick paste of the materials, and use plenty of it, rubbing the surplus off with a cloth. Another method is to sprinkle the powdered graphite on all metal parts.

ANTI-FREEZING MIXTURE.

Motorists employing an anti-freezing solution composed of alcohol and water, should test it from time to time to ascertain the strength of the solution. Alcohol evaporates, especially if the mixture has been prepared for low temperatures and contains a large percentage of alcohol. A device termed a pyrometer, a form of thermometer, is not expensive, and may be procured at any supply house. An occasional use of the device is recommended and it will prevent the possibility of cracked water jackets and a damaged radiator.

TIRE CHAIN HINT.

Examine the tire chains from time to time and if any links be worn, replace them with new. If when attaching the chains to the wheels it be found that the side chains are too long, cut them off, for nothing is so disagreeable as to hear the "clank, clank" of the chains striking the mudguards. When the free ends hit it displaces all of the paint, loosens the supports, and paves the way for repairs. Chains should not be too loose, for when the car skids undesirable stresses are imposed upon the rear axle and the tires.

McKeesport, Penn., has purchased a new Packard combination hose and chemical.



NEW ENGLAND'S SHOW.

Although not included in the circuit of national shows, the annual Boston display is undoubtedly in the same class with the New York and Chicago events, as it is thoroughly representative of the industry and affords the prospective purchaser an opportunity to inspect the latest models, a number of which were not ready for exhibition at the Chicago event. A feature of the New England show will be the eight-cylinder cars, and if announcements continue at the rate they have been made the past three weeks, the display of the latest type of motor should prove one of its many attractions. If the demand for space is any criterion, the success of the Boston event is already assured.

A DANGEROUS COMPETITOR.

That at least one mayor favors the motor vehicle is evidenced by his vetoing a resolution to extend a city owned street railway line three miles. The official makes the following assertion which, although antagonistic to the railway interests, will prove a boon to those persons designated as strap hangers.

"Automobiles are about to supersede car lines. Street railways in all parts of the country are experiencing difficulty in raising money for fear of motor 'bus competition. If the city, in the face of this fact, begins to spend money on further extensions, we are fools to rush in where angels fear to tread".

The city referred to is Seattle, Wash., where 500 motor 'bus owners have organized an association to assign routes for the "jitney" vehicles and operate them on regular schedule. Railway interests are stated to be opposing the motor 'bus which, fortunately, is finding favor, and which is but one more practical illustration of the commercial value of the motor propelled vehicle.

AMENDING THE LAWS.

Legislators are now busy endeavoring to improve the laws governing the operation of motor vehicles on the public highways. In the majority of bills reported there is a marked tendency to place all the responsibility upon the motorist, and one particular bill, if passed, would permit pedestrians antagonistic to the automobile to hold up the machine at pleasure. The motorist is willing to assume his share of the responsibilities, but the legislators would thrust upon him those of the pedestrian and other users of the highways. Such procedure is class legislation and should be opposed by motorists and automobile associations alike.

CARS USED CONTINUOUSLY.

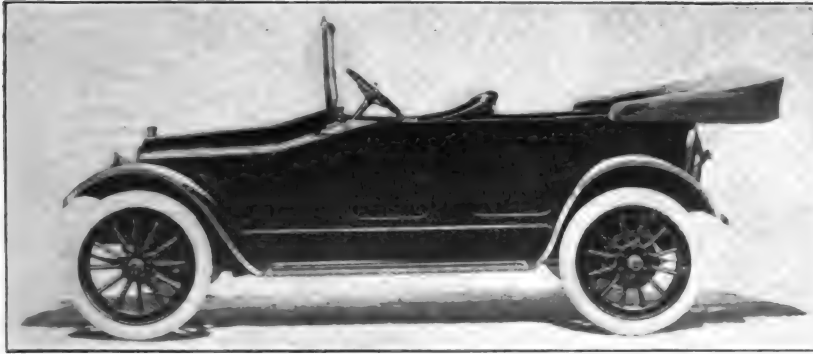
That the pleasure automobile is a 365-day-in-the-year vehicle is being strikingly demonstrated this winter. In decided contrast to former years is the practise of the motorist to utilize his car during the winter months. The development of the enclosed body, together with the motor starter, has made possible comfortable operation. Even the popular-priced car is now equipped with some form of enclosed body or top.

transportation of freight by auto truck is found local shows predict a prosperous year of business for the dealer and garage man. At both the New York and Chicago shows the number of accessories displayed broke all records. The trade was well represented.

CASE FEATURING MODEL 25 FOR 1915.

FOR 1915 the J. I. Case Threshing Machine Company, Racine, Wis., maker of the Case car, is offering three models. These are the 25,

"The Name Behind the Car" in the Case product carries with it years of experience in the manufacture of machinery. This concern, founded in 1842, first manufactured threshing machines, and when horse power became too burdensome, steam power was adopted. As a result steam power was developed, and the Case steam engines are leaders in their line. From the steam engine came the road roller, followed by other road machinery, and with the need in certain localities for fuel other than coal, the gas engine was found to answer the demand. Twenty years ago the Case Company saw the possibilities of internal combustion motor, and built what is known as the Patterson tractor. But it was not until 1911 that this concern developed a traction engine upon which it felt secure in staking its reputation. The gas traction engine, refined and adapted, is again found in the automobile, and the company believes that its evolution has culminated very logically in the motor and traction power found in its 1915 motor car product. The J. I. Case Threshing Machine Company has issued a small booklet entitled "A Bit of Early Automobile History", which should prove of special interest to all automobilists, and this will be mailed gratis to those asking for it. This traces the early development of the motor car and shows the unique position held by the Case Company in the automobile world.



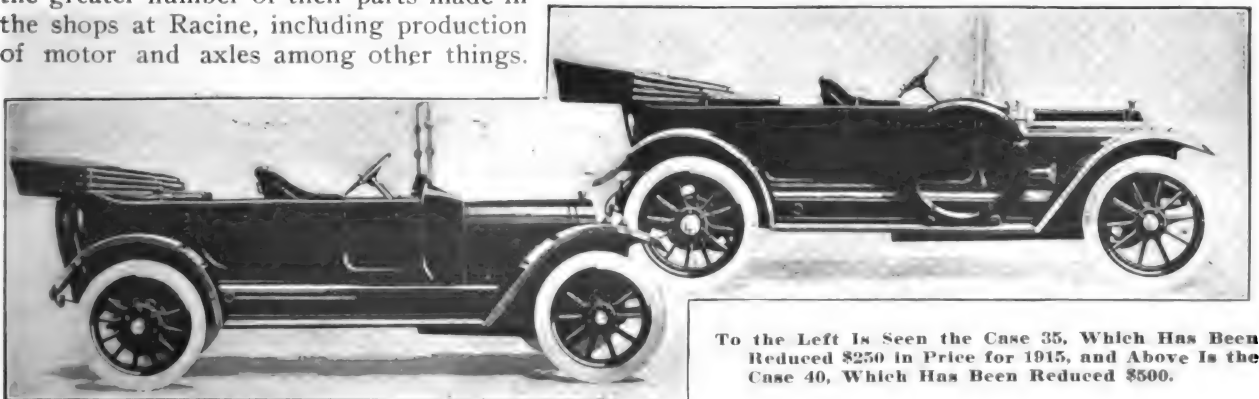
The 1915 Case 25 Model, Which Is Featured by a Longer Wheelbase, Case Made Motor and Axles and a Pure Streamline Body Effect.

35 and 40, and of the three the greatest interest for the current year centres around the 25. This model has been considerably altered compared with the 1914 design, and as it stands today it is a picturesque example of the coach builder's art. With a graceful sloping hood, the keynote body line is carried with a clean sweep from the radiator to the back of the closely fitted hood, and this, together with the clear, broad running boards, gives the Case car a distinctively artistic appearance.

One of the principal changes in the 25 model is the lengthening of the wheelbase from 110 inches to 115½, this being made possible by the use of cantilever rear springs instead of platform. Likewise, the tire sizes have been increased from 32 by four inches to 34 by four, and magneto ignition has been replaced by battery, using the accumulator of the Westinghouse cranking and lighting system. For 1915 Case cars will have the greater number of their parts made in the shops at Racine, including production of motor and axles among other things.

ities of internal combustion motor, and built what is known as the Patterson tractor. But it was not until 1911 that this concern developed a traction engine upon which it felt secure in staking its reputation. The gas traction engine, refined and adapted, is again found in the automobile, and the company believes that its evolution has culminated very logically in the motor and traction power found in its 1915 motor car product. The J. I. Case Threshing Machine Company has issued a small booklet entitled "A Bit of Early Automobile History", which should prove of special interest to all automobilists, and this will be mailed gratis to those asking for it. This traces the early development of the motor car and shows the unique position held by the Case Company in the automobile world.

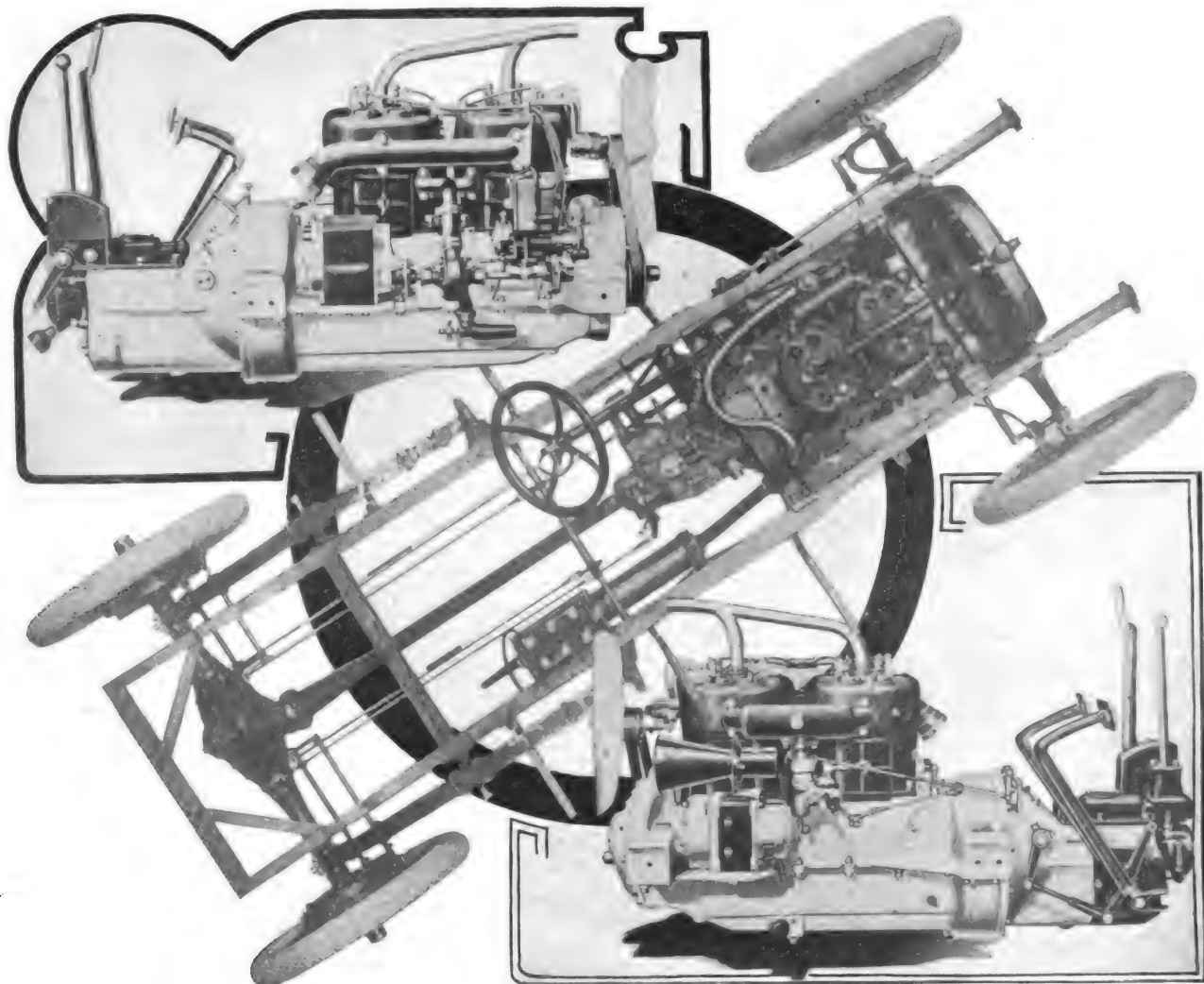
To revert to the 1915 Case product, it is seen that the 25 now has its inlet manifold heated by means of a by-pass from the exhaust, and an-



To the Left Is Seen the Case 35, Which Has Been Reduced \$250 in Price for 1915, and Above Is the Case 40, Which Has Been Reduced \$500.

other change is in the shifting of the spark plugs from the sides of the T head cylinders to the centre, the position occupied by the priming cocks in the 1914 models. The four-cylinder, water cooled motor is of the T head type, having its cylinders cast in pairs, and the bore of $3\frac{3}{4}$ inches and stroke of $4\frac{3}{4}$ gives it a horsepower rating of 22.50, S. A. E. formula, but the company states that 35 horsepower is easily developed on brake

shifting of the gasoline tank from under the front seat to the cowl has permitted the carburetor to be mounted in a higher position and still be fed by gravity. The lubrication is by constant level splash with a plunger pump forcing additional oil to the crank case, a sight feed being carried in the line between the pump and the case. The ignition is by the Westinghouse high-tension system, employing a separate unit, with auto-



In the Above Layout, the Right and Left Sides of the Case 25 Motor and a Bird's-Eye View of the Case 25 Stripped Chassis Are Noted—In the Chassis View the Method of Attaching the Cantilever Springs, a New Case Feature, Is Shown.

horsepower tests. The highest grade Wasson piston rings are fitted to the pistons, and these are designed to prevent the leakage of mixture and oil. The three-bearing crankshaft operates on babbitt bearings, bronze backed, and controls two camshafts with integral cams, the driving means being helical gears.

A Stromberg carburetor is employed, and the

matic spark control. The transmission members are a disc clutch, the three-speed gearset operates on Timken bearings, and the rear axle is a Weston-Mott three-quarter floating type, with a pressed steel housing.

A Westinghouse six-volt system provides for starting and lighting, and the head, tail, dash, work light and double-bulb arrangement for dim-

ming purposes in the headlights, are on a single-wire system. The front axle is of an I beam section, with Timken bearings, and the steering knuckles and arms are of chrome nickel steel. As stated above the rear suspension is taken care of by cantilever springs, the attachment of which is clearly shown in the accompanying plan view of the stripped chassis. The brake drums in the 1915 Case 25 have been enlarged from 12 to 14 inches, and these operate on a two-inch face in the conventional manner for both service and emergency purposes. The tires are 34 by four-inch Goodyears, non-skids being used on the rear wheels. The upholstery is of genuine leather, padded with high-grade curled hair, and cushion springs are used as a further comfort for passengers. A one-man mohair top, with quick detachable side curtains, rain vision, ventilating windshield are included. A foot rest has been added to the tonneau equipment, and in order to prevent the shoes of the tonneau passengers from scratching the back of the front seat the latter has been covered with what is termed a kick pad. The other equipment is made complete by a jack, tire pump, repair kit, foot and robe rails, etc.

A larger car is presented in the Case 35, and this has a four-cylinder motor, water cooled, cast T head in pairs, with a bore of $4\frac{1}{4}$ inches and a stroke of $5\frac{1}{2}$. The motor follows the general lines of the smaller 25 model; a Bosch dual system of ignition and a Rayfield carburetor are used. In a unit with the motor is a disc clutch and three-speed gearset driving by shaft to a full floating axle with a ratio of 3.58 to one. As in the 25, the starting and lighting system is the Westinghouse, and the wheelbase of the 35 is longer by $4\frac{1}{2}$ inches.

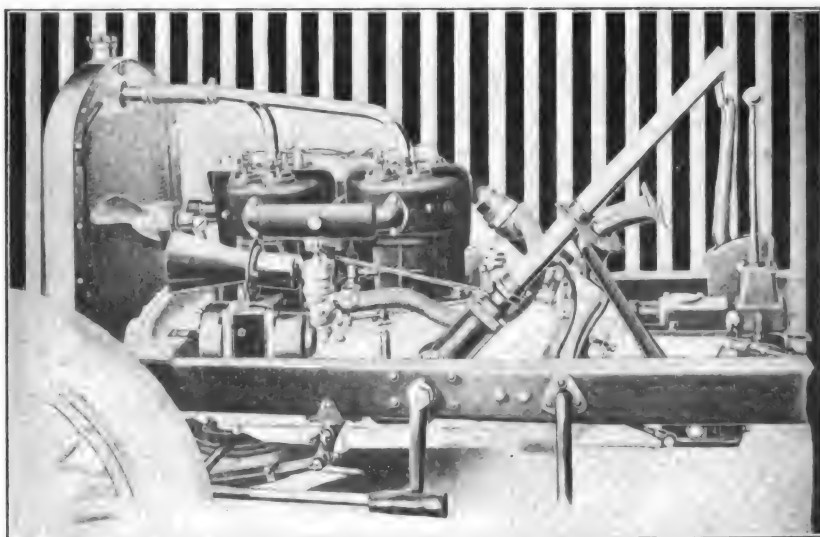
The Case 40 has a 124-inch wheelbase, and the motor is along the same lines as the other two, the bore being $4\frac{1}{2}$ inches and the stroke $5\frac{1}{4}$, giving it an S. A. E. rating of 32.40 horsepower. It is fitted with the Bosch two-point ignition, and the carburetor is a Rayfield. The 40 is the only model of the three that employs the right hand drive and control, the 25 and 35 both using the left drive and centre control.

All the prices of the Case cars have been changed for 1915, the 25 being increased \$100 and

the 35 and 40 being reduced \$250 and \$500 respectively. The company specializes in a five-passenger touring body, which is fitted to all three chassis, no roadsters being made. All Case prices are subject to five per cent. discount for cash. It should be pointed out that the prices of the Case 25, 35 and 40 models include the extra equipment of casing, tube, tire cover, Weed chains and clock. In other words, the Case goes to the owner complete in every detail.

McCLAREN HEADS RACINE RUBBER.

H. L. McClaren, president of the Mitchell-Lewis Motor Company, Racine, Wis., has been elected president and general manager of the Racine Rubber Company, that city, succeeding



A Partial View of the Case 25 Chassis, Showing the Motor Which Is Being Made in the Company's Racine Plant This Year.

George B. Wilson. This election took place at the first meeting of the new directors of the company, and other officers elected were Stuart Webster, vice president and treasurer, and H. C. Severance, secretary and general sales manager. All of these gentlemen are directors of the company, and the other members that go to complete the board are: L. B. Patterson, Joseph Weissenbach and L. T. Vance.

The company declared a cash dividend of $1\frac{1}{2}$ per cent. on the common stock, payable Feb. 1, to stockholders of record Jan. 30. The concern has shown a decided growth during 1914, the sales for the year amounting to \$2,400,000, and the net earnings \$570,000. In November last, a 50 per cent. stock dividend was paid in addition to the $1\frac{1}{2}$ per cent. cash dividend.

NEW AND PROPOSED MOTORING LAWS.

JOB H. LIPPINCOTT, state motor vehicle commissioner of New Jersey, in discussing in his annual report speed regulations for that state, comes out in favor of the maximum speed limit. Commissioner Lippincott expresses the belief that New Jersey might follow the lead of New York and several other states by increasing the maximum speed of motor vehicles to 30 miles an hour in the open country and to 15 miles an hour in the city. The speed permitted by the present law is 12 miles an hour in the built up portions of cities and towns where the houses are an average of less than 100 feet apart, and 25 miles an hour in the open country, with a special proviso that no drivers shall be permitted to operate a car at any speed greater than is reasonable for safety to travellers on the highway.

Under the present law, says the commissioner, the speed limits are regarded by his department as discretionary, and in the work of practical enforcement it has been his policy not to make arrests where the violation of the speed law was not of such a nature as to be aggravated. The commissioner says in part: "With the increasing speed of cars, and the installation of more perfect machinery and the equipment of cars with safety devices, it is conservative to say that there are but few drivers on our roads who do not exceed our speed limits. So general has this condition become that it is the opinion of this department that the speed limits must be enforced liberally.

"This has caused the department to issue general instructions to the inspectors where the operator of a machine is driving on a road where there is no traffic congestion and where there are no intersecting roads, that a speed of 30 to 35 miles an hour possibly would be permissible, and that, in the non-congested quarters of a town where the houses are less than 100 feet apart, a speed of 18 miles might be regarded as reasonable".

State Collects \$814,535.

For the year 1914 the department collected \$814,535, as compared with \$661,084 for 1913, an increase of approximately 23 per cent. The receipts from fines for violations of the law were \$25,025, an increase of \$3739 compared with the previous year. The number of automobile licenses issued during the year was 60,247, compared with 48,892 last year, an increase of 11,355. The number of driver's licenses issued was

70,313, an increase of 15,057. Summarizing his report the commissioner says: "The year has been one of unprecedented development, both in the volume of department work and in the determination of important department policies. So rapid is the growth of this department and so new are its problems, that its management presents difficult questions of administration for which there is no precedent".

Traffic Regulations Unsafe.

It is maintained that the present system of traffic regulation through local ordinances is unsafe, for the reason that there is a conflict between traffic ordinances in different cities, and to remedy this, Mr. Lippincott recommends a state traffic act and the abolition of the present system of local traffic ordinances. Providing illuminated rear number tags and a law imposing a severe penalty upon any person who has in his possession a car whose maker's number has been apparently altered or whose engine number has been mutilated, are other changes sought. The purpose of the latter recommendation, of course, is to prevent the stealing of cars.

Severe Penalty for Intoxicated Drivers.

Laws pertaining to persons who drive automobiles while intoxicated should also be changed, says the report. While the punishment should be summary, yet the present law is stated to be so severe that it is unenforceable. It is recommended by the commissioner that the law be changed so as to permit of a severe fine or imprisonment, and a minimum fine of \$200, with the alternative of imprisonment, or both, is suggested for the first offense. For the second offense imprisonment alone is thought to be the proper penalty.

Wants Legislation on Searchlights.

The question of powerful searchlights should be taken up by this legislature, says Commissioner Lippincott. He states that there are a number of devices for dimming glaring headlights and that there is, therefore, no longer any excuse for the failure of the legislature to enact a law requiring that some device be used to insure safety to other users of the roads.

Question of Trucks and Buses.

The legislature should empower the commissioner to determine whether motor trucks and other motor vehicles, as to width, height and weight, are safe vehicles for operation on the state highways, and allow him to revoke the

license or refuse to license vehicles held to be unsafe in these particulars. The commissioner further urges that legislation be passed for the proper regulation of motor 'buses. He also seeks a law governing the licensing and operating of trailers for motor trucks.

Liberal Registration Law Sought.

Another feature of the commissioner's recommendations is the permission to transfer car registrations from one car to another, in addition to transferring them from one owner to another. This would be done on proper application to the department and on payment of an increase in the registration fee.

Two Classes of Drivers' Licenses.

Two classes of drivers' licenses are likewise suggested; one for the professional, with the holder's photograph on his license card, and one for the owner, in order that the work of regulation may be simplified. He states that it is important that only honest drivers be given licenses, and with a professional driver's license established, it would be possible for the department to refuse to license any person having a criminal record.

NEW GARAGE MEASURE PASSED.

The Providence, R. I., common council unanimously adopted a resolution seeking the passage of legislation by the general assembly to regulate the location, erection and maintenance of public automobile garages. The bill as passed contains none of the retroactive features which were strongly objected to at the public hearing recently held.

Likewise, by a unanimous vote, the council adopted the resolution, recommended by the highway committee, directing the paving of Broad street, Providence, from Prairie avenue to the city line, with asphalt. Messer and Knight streets will be paved with bitulithic.

SEAMAN SAFETY DEVICE.

C. D. Seaman, 90 Chenango street, Binghamton, N. Y., has invented the safety device, shown herewith, for displaying signals that can be seen from both in front and at the rear of a motor vehicle. The device also indicates the direction in which the car is going.

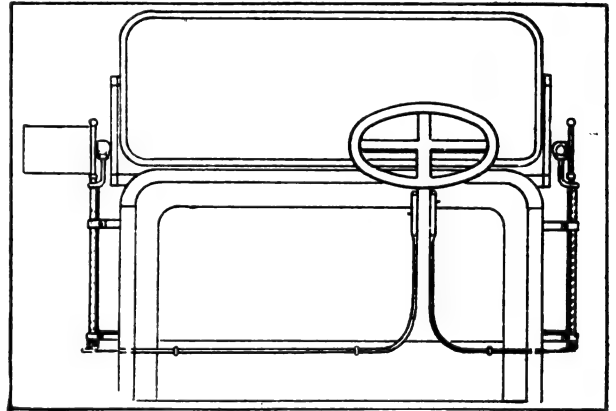
With the signal displayed on the right side, it indicates a turn to the right, and similarly a left hand turn is signalled on the left. With both

signals displayed they indicate a stop, and when none is in view the car is travelling in a forward direction.

There are two signals, one on either side of the machine, and they operate independently of each other, and being identical, one description will serve for both. It is rectangular in shape and is attached to a shaft which is supported by a tube having a bearing at each end. The tube is fitted to the side of the car by clamps, or it may be installed just inside of the body, the maker recommending the latter position.

The shaft carrying the signal is limited to a movement of 90 degrees. This permits the latter to be moved from a position parallel with the side of the car (at rest position) to a place at right angles with the side of the car (set position).

Attached to the lower end of the signal shaft is an arm, to which is secured a cable that runs



Details of the Seaman Safety Signalling Device.

through a tube to a latching device located on the steering column just under the wheel. This latching device controls the desired signals of "At Rest" and "Position", retaining the signal in these locations.

One end of a coiled spring at the lower end of the signal shaft is attached to a shaft arm, and the other end to the shaft bearing tube. This spring moves the signal to the "Set" position when the steering column device is unlatched. A lamp is provided for each signal, and the light is controlled by a switch on the signal shaft, which turns on the light when the signal is set, and turns it off when not in service. The lamps are connected with the lighting system of the machine.

The Los Angeles, Cal., board of public works contemplates the purchase of a 1½-ton motor truck.

THE LINCOLN HIGHWAY IN CALIFORNIA.

*By George B. Harrison.

WHEN the Lincoln highway reaches California, it is actually spread out, by means of the state highway system now under construction, into a series of paved roads running to the Oregon line and to Mexico, as well as the main continuation into San Francisco.

The people of California voted a bond issue of \$18,000,000 in 1910 for construction of permanent roads from the Oregon line to San Diego and connecting the various seats with about 3000 miles of improved highway.

The Lincoln high-

just west of Sacramento, which, when finished, will enable a traveller to take a route into San Francisco about 30 miles shorter than that now available most of the year. This road passes through a rich agricultural portion of the Sacramento valley and divides to make a choice of two routes around the bay.

By one of these, the Carquinez straits will be crossed on a ferry and a paved road skirting the bluff along the bay will lead into Berkeley and Oakland, where the ferry will again be taken to San Francisco. By the other, Napa and the



Through Redwood Forest.

way will connect with this at Auburn or Placerville, depending on whether the tourist takes the direct route or that by Lake Tahoe. Both of these routes connect at Sacramento and from the state capital, the roads runs almost in a direct line into San Francisco. The California highway commission now has under construction about three miles of concrete trestle over what is known as the "Yolo by-pass",



Along the Pacific Ocean.

beautiful Napa and Sonoma valleys will be touched and the traveller will reach the bay ferry at Sausalito, just north of San Francisco. These roads, in conjunction with others in the state highway system, make a complete tour around San Francisco bay both north and south.

The state highway leads north from San Francisco through the famous Petaluma and Santa Rosa country and under redwood trees for miles up to the port of Eureka on the northern California coast. Another coast road runs south



The Top Picture Shows the Pit River Falls and the Lower Shows Scene on the Coast Route Between San Francisco and Los Angeles.

*Editor, Highway Bulletin, published by the California Highway Commission.



Mountain Road of California Highway, Showing Safe Width of Pavement and Guard Rail Protection.

through San Jose and Santa Barbara into Los Angeles and from Los Angeles to San Diego. The main route, through the valleys connecting with the Oregon highway at the state line, traverses a beautiful scenic region in the Sacramento canon northward toward Oregon and Washington, from which views of Mt. Shasta and Lassen peak are obtainable, and southward along the level plains of the Sacramento and San Joaquin valleys to Bakersfield, where the mountain range is crossed into Los Angeles. These trunk lines are being paved with concrete with an asphaltic oil surfacing, which makes virtually a city street in the country and through the mountains. The maximum grade is six per cent. with a few short exceptions of $6\frac{1}{2}$ or seven per cent., and the roads are wide enough to make touring a pleasure even in the most rugged mountain sections.

The state highways system is at present only planned to Auburn or Placerville, about halfway between Sacramento and the state line, but efforts are being made to furnish an ideal road on the Lincoln highway from the California-Nevada line. As the Lincoln highway crosses California, it is joined here and there by the paved cross highways of the state system, which makes it possible for the traveler to reach easily any point in California he may desire.

Plans for beautifying the Lincoln highway between San Francisco and the Nevada line are already under consideration by the women's clubs of the state. In some portions, typical

California trees will be planted, and it is also suggested that flowers and shrubs be furnished by the women of the different counties through which the Lincoln highway passes. The California Federation of Women's Clubs has a forestry committee, which is taking an active interest in this line, and in the state highway system elsewhere.

It is estimated that the state highway section of the Lincoln highway will be paved in California by the end of 1915. The "Yolo by-pass" trestle, which is the main factor in shortening the distance, is to be finished by

July, 1915, and will probably be made the occasion of a Lincoln highway celebration at Sacramento.

As the Lincoln highway traveller reaches the Pacific ocean he will find a large number of delightful tours, which may be made in one or two days, or lengthened out to a year's travel, as he may desire. Around San Francisco will be a number of short trips to California resorts and to points of scenic interest, such as the big trees, petrified forests, geysers, beach and mountain trips, to the home of Luther Burbank and other famous Californians, and to famous fishing and other resorts farther away. Good roads lead to the redwoods of Northern California and to California's famous volcano, Lassen peak, and into the hunting and fishing regions of the mountains.

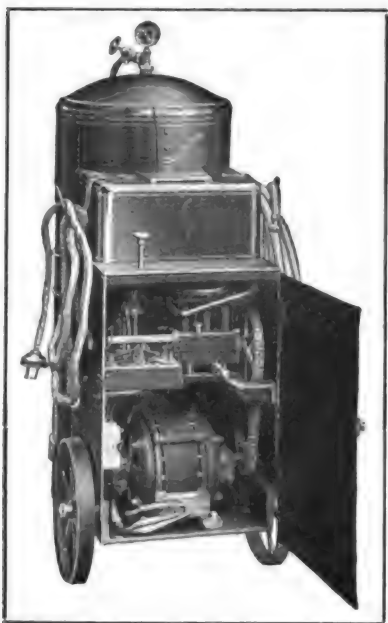
Three Signal trucks have been purchased for the United States mail service in Detroit, Mich.



Grading Mountain Road on the California State Highway.

NEW KELLOGG GARAGE PUMP.

The Kellogg Manufacturing Company, Rochester, N. Y., maker of garage and motor vehicle power pumps, has brought out a new type of motor driven garage pump of the portable design. As may be noted by the accompanying illustration, the new equipment has many practical advantages, as it is a unit construction, and the motor, compressor, etc., are entirely enclosed. These components, however, are readily accessible by means of a door.



Kellogg Motor Driven Garage Pump.

The outfit is complete in every respect, and one of the several advantages claimed for it is its low cost of operation and maintenance, a feature of interest to all garages. The pump is driven by an electric motor and has a capacity of 200 pounds. The maker states that it will inflate 16 34 by four-inch tires from flat to 80 pounds pressure without replenishing the supply. One of the features of the equipment is the automatic control, the details of which, as well as prices, will be supplied by the maker upon request.

MOUNT DESERT LEGAL FIGHT.

Another hotly contested fight for automobile rights is scheduled shortly when the question of permitting the use of motor cars on Mount Desert island will be considered. It will be recalled that, after several years of fight in the Maine legislature, permission was finally secured for motorists to take their cars over the main land to Bar Harbor, Me., the largest of the various shore resorts on the famous island. This victory extended to the towns of Southwest Harbor and Tremont, both on the lower end of the island. However, there are four towns on the island, and between Eden and the other two named above lies the town of Mount Desert. This

runs across the island and includes the summer colonies at Seal Harbor, Northwest Harbor and Somerville and, while automobiles were admitted to these towns, they were barred from Mount Desert, except for a rough and roundabout road by which they could pass from Eden to the two towns at the other end of the island.

If the present scheduled fight is successful the entire group of towns will be thrown open to the automobile, and the run of the whole island will be made possible. Motorists are disgusted with the present conditions, and it is pointed out that the dire things that were predicted to follow the advent of the motor car into Bar Harbor have not materialized. The love of quiet, the narrow roads and fondness for the horse are the reasons given for the strong opposition by the residents of Mount Desert.

NOVEL MOTORCYCLE SLED.

Ben Eisenman, Sheboygan, Wis., is the inventor of the novel motor sled shown in the accompanying illustration. The power plant was obtained from a motorcycle, and is a four-cylinder, air cooled motor, which is mounted in a sub-frame as shown. The operator sits over the rear runners, which are actuated by a vertical steering column to which is attached a wheel. One of the novel features of the machine is the control of the fuel, a handle being conveniently located directly over the wheel.

The fuel tank is placed on a platform, well above the motor, affording good pressure by gravity. Control of the clutch is by the left



Novel Motor Sled Constructed by B. Eisenman, Sheboygan, Wis., from a Motorcycle—A Speed of 35 Miles an Hour Has Been Attained with It.

foot, while the brakes are operated at the right as shown. Mr. Eisenman states that he has attained speeds of 35 miles an hour with his sled and that it has given him considerable pleasure.

TRUCK BRINGS GOOD ROADS.

The successful competition of the commercial vehicle with the steam and electric railroad in the hauling of short distance freight and in the passenger business, is given as one reason for extensive road improvement, in the report of the joint congressional committee on federal aid to good roads. Discussing this phase of the subject, the Hon. Jonathan Bourne, Jr., chairman of the committee, says: "A great system of rural transportation would be developed, with rates regulated by actual competition, open to rich and poor alike, as no expensively privately owned terminals, road beds, tracks, or equipment would be required. The good wagon roads would be open everywhere to the use of everybody, and the equipment, relatively inexpensive, would be within the means of many.

"This suggestion as to the use of rural roads by commercial auto trucks and 'buses is not merely a product of the imagination. In several instances gasoline propelled 'buses are now competing successfully with city or interurban electric lines, and, where the haul is but a few miles, transportation of freight by auto truck is found cheaper and more satisfactory than transportation by rail. In the case of the short haul, the saving in handling and in time more than counterbalances the lower rail rate. Instead of loading the commodities on a truck, unloading at the local railroad station, where they must be loaded upon the cars, hauled to the near-by city and then unloaded and again loaded upon a truck and hauled to the consignee, the user of an auto truck who has a hard surface road available loads his product once, hauls it to the door of his consignee and unloads, saving not only the handling, but the time, the inconvenience of issuance of way bills and receipts, and avoids damage to goods or deterioration while in transit. We believe that permanent highways will result in very considerable adoption of auto truck hauling in preference to rail transportation, where the distance is within a half-day's run".

WILLYS LEAVES FOR CALIFORNIA.

John N. Willys, president of the Willys-Overland Company, Toledo, O., has left for California, where he will spend several months on the Pacific Coast. Before leaving Mr. Willys predicted that the output of American automobiles for 1915 would increase at least 25 per cent. over 1914, and would exceed 500,000, valued at \$500,-

000,000. He said: "The new year brings with it a national trade revival that will be felt in all branches of our industrial life. Business already is beginning to boom. The optimistic spirit of the banker, farmer, merchant and manufacturer alike plainly indicate a wave of prosperity. A thorough investigation of conditions shows that business confidence has returned after the setback caused by the opening of war. We all do business on good cheer, courage and hope. Although the sudden crisis caused by European hostilities almost deprived us of these for a while, and brought about a psychological depression, we have recovered from the shock. Trade has been steadily picking up since last October", he continued:

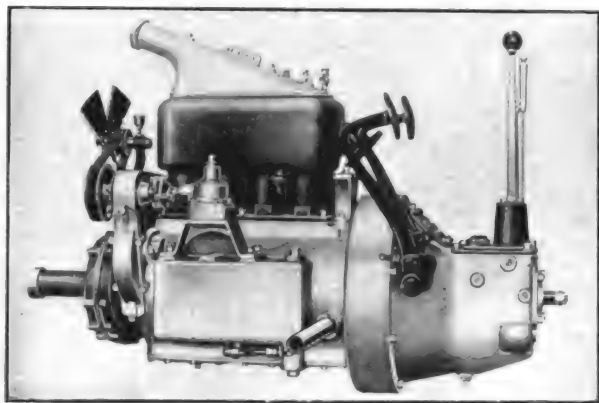
"The real power of any nation depends, not upon the size of its army or navy, nor the cash in its banks, but upon the number and quality of its food producers. With one-third of the food producers of the world on the field of battle and another third unable to market its produce, the remaining one-third, mostly American, has become the world's provisioner and is becoming highly prosperous in a time of depression for the rest of the world. Our farmers have gathered crops of unprecedented abundance and are marketing them at the highest prices received for many years. Whatever else the survivors of the war may lack, they must have food. The farmer has been helped—not hurt—by the war. We are beginning to realize that the millions of dollars being poured into this country for food, clothing and other necessities which we alone can supply, are going to stay here and be circulated in America by Americans".

WOODS MOBILETTE BODY TYPES.

For the spring trade, the Woods Mobilette Company, Harvey, Ill., announces two types of delivery cars in addition to a variety of pleasure car designs. One of the delivery models has a full panel enclosed body and the other an open delivery box body with a folding top for the driver's seat. These delivery cars are built on the same chassis as the pleasure car models of Woods Mobilette, and the construction includes a four-cylinder, water cooled motor, developing from 10 to 16 horsepower. A sliding gear transmission is employed, and a leather faced cone clutch. The rear axle construction is of the full floating type, and an over and under design of frame construction permits the use of long springs.

BRINGS OUT TWO NEW MODELS.

THE Pittsburg Model Engine Company, Pittsburg, Penn., has brought out two new types of motors, a four and a six, the former being de-



New Four-Cylinder Motor Being Manufactured by the Pittsburg Model Gas Engine Company.

signed for light pleasure motor vehicles. As may be noted from the accompanying illustrations, showing both sides of the four-cylinder motor, a unit power plant is employed.

The cylinders are cast en bloc and have a bore of $2\frac{3}{4}$ inches and a stroke of $4\frac{1}{2}$. These cylinder dimensions are rated as productive of 12.1 horsepower by the S. A. E., but the maker states that the rating is very conservative, it having been exceeded in brake tests.

The valves have a clear opening of $1\frac{1}{8}$ inches, are interchangeable, and are protected from the abrasive action of road dust by an easily removed plate. A two-bearing crankshaft, $1\frac{1}{2}$ inches in diameter, is utilized, and the front bearing is two inches long and that of the rear $2\frac{1}{2}$. The connecting rod bearings are ample in size, two inches, and these and the main bearings are bab-bitt lined bronze. The connecting rods are easily accessible by means of a large plate on the bottom of the lower crank case, which is of aluminum and of the barrel type. The wristpin is $\frac{3}{4}$ -inch in diameter and has a bearing of $1\frac{7}{16}$ inches.

The intake manifold is cast with the exhaust, a construction making for economy of fuel, and the cooling is by the thermo-syphon system. The timing gears are helically cut, 10 pitch, are readily accessible, and the lubrication is by the automatic constant level splash system. The design of the motor provides for the use of either a magneto or a distributor.

Provision is made for installing any standard

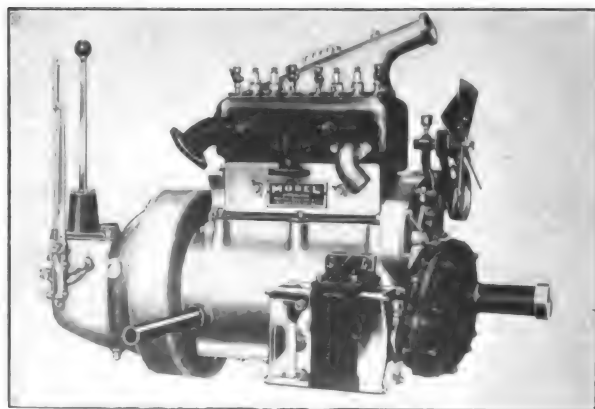
make of single or double-unit electric lighting and motor starting system, and the connection between the motor starter and the engine is by a silent chain applying the energy to the front end of the crankshaft. The chain is fully enclosed, readily accessible, and runs in oil. The reduction is three to one.

The motor is built with a three-point suspension, a steel tube passing through the crank case at the rear affording two points, while the third is obtained by the crank housing at the front of the power plant. The clutch is a multiple-disc, and the gearset provides the conventional number of forward speeds and a reverse. Centre control is employed, interchangeable for right or left hand drive. The complete power plant weighs 210 pounds.

The company is also producing a six-cylinder unit power plant, the cylinders of which have a bore of three inches and a stroke of five.

The cooling is by a centrifugal pump located on the right side facing the gear end, and all the gears are helical. The lubrication is by the constant level splash system, a plunger pump circulating the oil. The camshaft operates in oil as it is submerged.

The design of the crank case provides for mounting the lighting generator-motor on the left hand side of the motor and the energy of the starter is conveyed to the crankshaft of the engine by a silent chain. An option is given of either a multiple-disc or a cone clutch, and a



Showing the Intake Side of Model Motor and Method of Mounting Motor Starter.

magneto or distributor may be employed for ignition. The weight of the motor alone is 250 pounds, that of the complete unit, 450.

NEW MACHINERY, TOOLS AND EQUIPMENT.

THE Monarch Machine Company, Sidney, O., is manufacturing a line of lathes, one of which, an individual motor driven and single-pulley driven, is shown herewith. The Monarch geared headstock can be applied to all sizes of lathes produced by this concern.

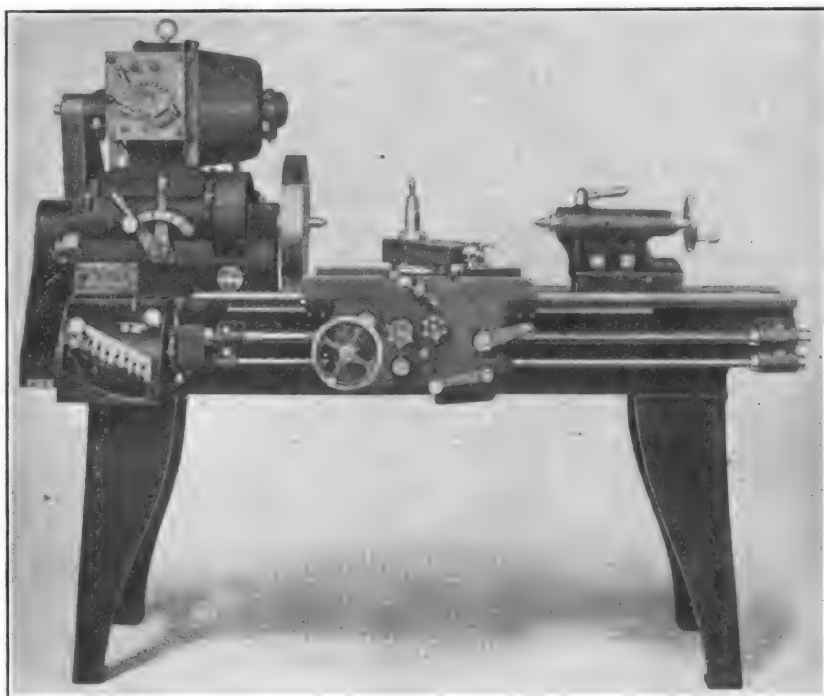
The headstock provides eight mechanical changes of spindle speeds covering a wide range, any one of which is practically instantly obtained by the two levers on the front of the headstock. With the driving shaft at the recommended speed of 300 revolutions a minute the spindle speeds afforded are as follows: 25, 40, 58, 83, 116, 182, 262, 375. This, the maker points out, provides a sufficiently wide range of spindle speeds for all practical purposes. A wider range of speeds can be furnished, if desired, by using a two-speed countershaft with the single-pulley drive, and a variable speed or multi-speed motor with the motor driven lathe.

The headstock is of the solid, full webbed type, carefully aligned with the bed, and its rigidity and close adjustment prevent chattering on heavy cuts. The spindle is large, is made of 50-point carbon crucible steel, and is accurately ground to size. Phosphor bronze is employed for the spindle bearings.

The bed is wide and deep with heavy walls and large box girders afford strength. The back gears are locked in and out of position by a spring plunger, and the double back gears are of the positive geared type. The tailstock is substantial, has two clamp bolts and is so shaped that the compound rest can set at right angles when turning work of small diameters. All joints are carefully hand scraped, insuring accuracy and alignment. The lathe has a feed reverse, and an interlocking device prevents the feed rod and lead screw from becoming engaged at the same time. The rack pinion disengages when screw cutting.

The mechanical principles used in the Mon-

arch geared headstock are the same as utilized in the gearset of the motor vehicle, having sliding gears and positive clutches. Twelve gears comprise the gearing, eight of which are constantly in mesh and four slide in and out, these being of steel. All gears are cut eight pitch and are $1\frac{1}{4}$ -inch face. The two shafts are $1\frac{3}{4}$ inches in diameter and operate in phosphor bronze bushings. The two levers on segments on the front of the headstock provide the eight mechanical changes of spindle speeds. Details and prices of the

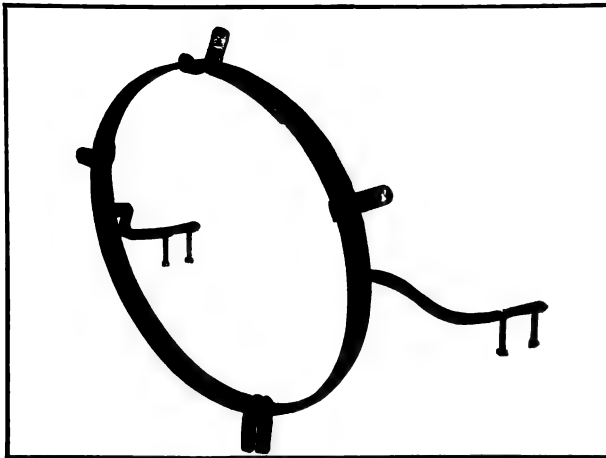


The Monarch Individual Motor Driven Lathe, Operated by a Two-Horsepower Constant Speed Motor—Drive Is by Silent Chain.

lathe, as well as of the other products of the company, will be supplied upon request.

SAFETY TIRE HOLDER.

The Auto Forge Sales Company, Box 564, Columbus, O., is manufacturing the Safety adjustable tire holder, which is especially adaptable to the model T Ford car. One of the features emphasized by the maker is its strength, it being stated that one can stand on the holder without damaging it. The device is attached to the rear of the machine, where it covers the rear axle and spring, improving the appearance of the car.

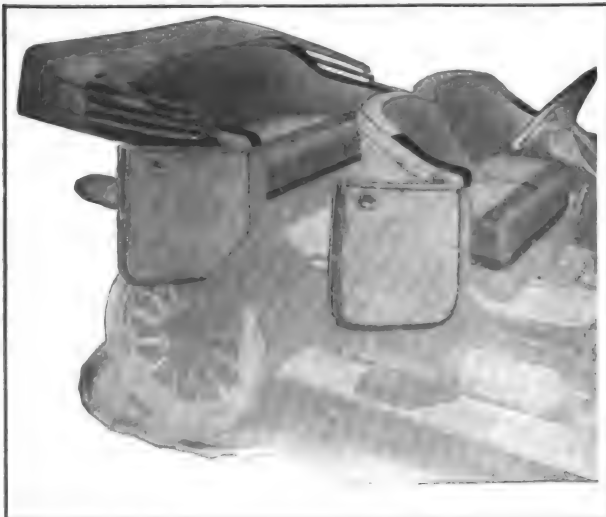


Safety Tire Holder for Ford Car, a Sturdy and Weather Proof Construction.

The Safety holder secures the tire in such manner that there is no movement to chafe the tire cover or casing, and another noticeable feature is that the construction prevents the entrance of water or other foreign elements, as the band provides protection. Another advantage is that the tire is kept in its normal shape. The band is of steel, and by using extra straps two tires can be carried. The Safety holder is nicely finished.

BADGER SEAT COVERS.

The use of seat covers on a motor vehicle not only improves the appearance of the machine, but protects the upholstery. Seat covers have another advantage: They keep the leather in first-class condition and increase the value of the machine when it is sold. They are also of service



Illustrating the Badger Seat Covers Which Are Made for All Types of Cars.

in protecting the clothing of the passengers.

The Wisconsin Auto Top Company, Racine, Wis., is producing the Badger seat covers, which are strictly high-grade in every particular. The company manufactures these covers for every type of pleasure motor vehicle and the trade is invited to write for catalogue and discounts.

J & B TRANSFORMER COIL.

The J & B Manufacturing Company, Pittsfield, Mass., is producing the J & B transformer coil, which is designed to be utilized with all makes of low-tension magnetos. The maker states that the coil was specially constructed for this particular work, that it draws very little current from the magneto or battery, and that it affords easy starting as well as obtains efficiency when the motor is operating slowly.

The windings are well insulated to prevent the possibility of short circuits,

and a safety spark gap protects the windings in the event a cable is detached from a plug with the motor operating. The platinum points are large, and an ample-sized condenser reduces sparking.

A starting button is incorporated on the side of the coil box and the large platinum points are stated to last indefinitely. One of the features of the coil is the fact that no wires enter the switch. All connections are made through the screws, which retain the switch in place. This, the maker points out, prevents short circuits. The binding posts, brackets, etc., are substantial, and the maker guarantees the coil for life.



J & B Transformer Coil.

NEW C-C SHOCK ABSORBERS.

The Cox Brass Manufacturing Company, Albany, N. Y., which concern has been specializing in metal products for over 42 years, and whose shock absorbers are in service on all types of motor vehicles ranging from 1000 to 5000 pounds in weight, has brought out a new design, termed the C-C. The new absorbers come two to the set and are moderately priced. With each set are included four improved grease lubricated bolts for attaching the absorbers to the car. The construction of the design is extremely simple, a slotted spring cage, with two bolt holes through



New C-C Shock Absorber Brought Out by Cox Brass Manufacturing Company.

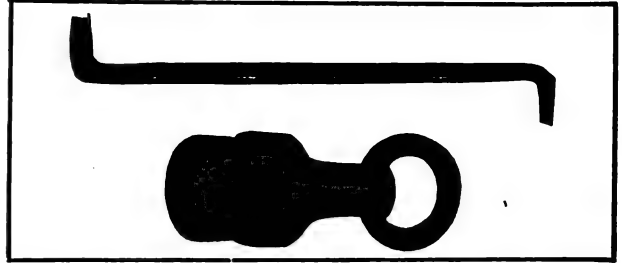
which the bolts pass, displacing the shackle bolts of the car. The C-C is for all cars except the Ford.

Located in the spring cage are three sturdy helical springs of finely tempered steel, making the absorber sensitive to all road conditions. The spring of the largest diameter absorbs the

heavy jolts, while the smallest extinguishes vibration. The middle member co-operates with the other two. A long bearing surface on the reciprocating parts makes for durability and prevents rattling. A nut at the base permits of adjusting the C-C to meet all requirements of service. The Cox Brass Manufacturing Company will supply details of its new product upon request.

HANDY VALVE STEM RELEASER.

The Auto Forge Sales Company, Columbus, O., is manufacturing the Universal valve stem



The Universal Valve Stem Releaser and Offset Screw Driver Made by the Auto Forge Sales Company.

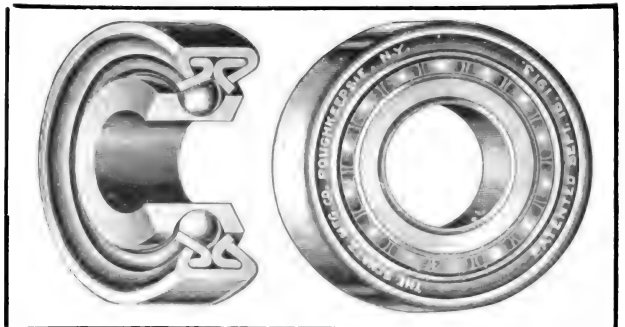
releaser shown herewith, which is adaptable to motor cars and motorcycles. It has a concentric post and screws on in place of the valve cap. Two turns of the thread opens the valve, releasing the air and makes possible rapid deflation of the tube. The Universal can be carried on the key ring or chain.

The company is also producing an offset or bent end screw driver, composed of bar steel five inches long and $\frac{1}{4}$ -inch round. It is handy where an ordinary tool cannot be used and also will serve as a cotter pin extractor. Details and prices will be supplied upon request.

UNIVERSAL BALL BEARINGS.

The Schatz Manufacturing Company, Poughkeepsie, N. Y., is offering two distinct types of annular ball bearings to meet the requirements of the light car manufacturer, the accessory maker and the trade in general. The bearing for the light car trade is a full type and is made in one-inch size. The bore, the ball races in both the cone and cup rings, also the overall dimensions, are ground within standard limits.

The other type of bearings is made in metric dimensions to interchange with the conventional series of international standards. The maker calls particular attention to the large amount of radial thrust these bearings will take. The company will supply information to engineers and all interested parties upon request.



Showing the Construction of Universal Ball Bearings.

NEW YORK SHOCK ABSORBER.

The New York Coil Company, 338 Pearl street, New York City, is manufacturing a new



The New York Shock Absorber.

shock absorber for the model T Ford car, termed the New York. One of its features is that it can be attached without removing the rear wheels or front axle perches, as the New York replaces the regular spring shackles. A feature emphasized by the maker is that there are two motions, up and down, as well as a side movement to compensate for the lengthening and shortening of the spring caused by the movement of the car. It is stated that side sway of the body is eliminated. The device cannot come in contact with the front fender

irons and ample clearance is provided from the spokes of the rear wheels, as the absorbers move away from the fender braces. The price a set is moderate, and the workmanship and material are first-class.

PIERCE SPEED CONTROLLER.

The Pierce Speed Controller Company, Anderson, Ind., is marketing a new type of the Pierce speed controller, and many advantages are claimed over the model previously manufactured. The model G is driven from the propeller shaft just back of the gear-set, and the maker states that the controller is adaptable to any make of gasoline motor vehicle.

The method of application is said to be very simple. The controller is placed between the intake manifold and the carburetor, as shown by the accompanying illustration. Incorporated in the controller is a valve box having an auxiliary butterfly valve, which is operated by centrifugal force from the controller itself.

Drive is by a flexible shaft contained in a flex-

ible housing, the drive proper being by a pair of spur gears having a ratio of two to one, so that the controller is operated at half motor speed. The new controller is not graduated to a certain number of miles an hour, as is the wheel driven type, but is adjusted by a small screw, and may be set with the speedometer at any desired speed.

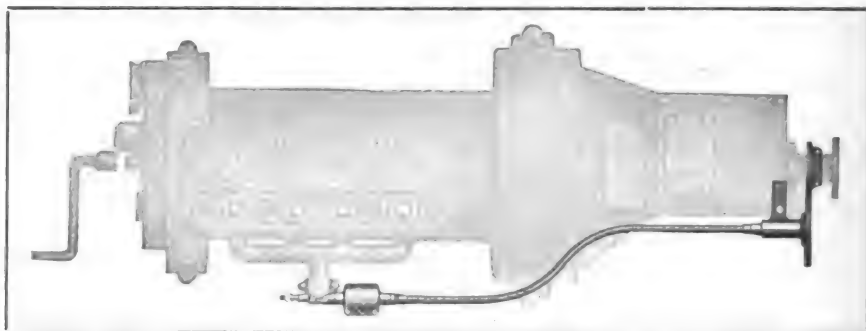
The maker states that the controller serves to regulate the speed of the car to miles an hour; that is, vehicle speed, and does not interfere with the power developed by the motor, being entirely independent of the number of revolutions made by the engine. The controller does not come into action until the car attains the speed for which the device is set.

The controller is especially adapted for service with light trucks, fire apparatus, taxicabs, ambulances, etc., where it is desired to limit the speed of the vehicle. Details and prices will be forwarded by the maker on request.

PROTEST AGAINST NO BONUS.

Protests from certain employees of the Ford Motor Company at Atlanta, Ga., because their salaries under the profit sharing system were reduced, have been answered by James R. Lee, chief of the sociological research department of the Detroit office. The Atlanta investigators cut certain salaries when they learned that the recipients were not properly sharing their pay with their families or making no effort to save.

J. Edward Newton of Fall River, Mass., was elected president of the new association of Bristol County Automobile and Supply Dealers at a meeting held recently at the Taunton Inn, Taunton, Mass. Other officers elected were: John



Illustrating the Pierce Speed Controller Installed on a Gasoline Motor Vehicle.

Robertson, first vice president; John S. Coy, second vice president; Howard L. White, treasurer, and Arthur Fontaine, secretary.

NEWS OF THE MANUFACTURER.

The Briggs-Detroit Company, Detroit, announces that it will market a low-priced eight-cylinder car on a large scale. The new car will sell for \$1295. Following closely the distinctive lines of the 1915 Detroit four, the new eight is more elaborate and embodies many advanced ideas. It is finished in a beautiful Kimball green with gold stripes and has Turkish type upholstery in leather.

The Dort Motor Car Company, Flint, Mich., completed its organization recently. The company is capitalized for \$500,000, for the purpose of manufacturing automobiles. The stock is \$100,000 preferred and \$400,000 common, with \$217,000 paid in. The working capital will be increased to approximately \$250,000. The directors are all members of the present Durant-Dort Carriage Company's organization.

The Mutual Motors Company, Indianapolis, Ind., organized recently with \$1,000,000 capital, will manufacture automobiles in Jackson, Mich., for Marion Motor Company of the former city, and also for the Imperial Automobile Company of Jackson.

Dusenber Bros., St. Paul, Minn., has opened its new motor manufacturing plant.

The Stewart & Clark Manufacturing Company, Chicago, Ill., will erect a six-story addition to its already large plant, at a cost of approximately \$75,000. The company manufactures a line of automobile supplies and is located at 1828 Diversey boulevard.

The Regal Automobile Company, Detroit, Mich., is planning to construct a large addition to its plant in Berlin, Ont., to be built in the early spring.

The Fair-Anderson Company, Chicago, Ill., contemplates the establishment of a branch factory for the manufacture of automobile tires at an estimated cost of \$125,000.

The National Carbon Company, Cleveland, O., has declared its regular quarterly dividend of 1½ per cent. on the preferred stock, which will be payable to stockholders of record Feb. 15.

The Montana Improved Spring Wheel Company, Livingston, Mont., is preparing plans for the construction of a plant to manufacture spring wheels for automobiles.

The Kelly Motor Truck Company, Springfield, O., will erect an addition of reinforced concrete, which will be 50 by 260 feet.

The Mecca Tire Company, Trenton, N. J., has purchased the building formerly occupied by the American Lamp and Brass Company. It is being remodelled and improved for the purpose of tire manufacturing. The property covers about three acres and contains six brick buildings, 30 by 90 feet each, five of them 2½ stories high and the other 3½ stories. These buildings will be equipped with the necessary modern machinery to turn out from 250 to 300 tires a day.

The Olds Motor Works, Lansing, Mich., is again issuing its house organ, known as the Official Bulletin of the Olds Motor Works, as a monthly periodical.

The Blood Bros. Machine Company, Allegan, Mich., has moved from Kalamazoo and will continue to manufacture universal joints and the Cornellian light car at the former city.

The Motor Ignition and Devices Company, Detroit, recently organized, has opened offices in the Boyer building and will manufacture ignition apparatus for automobiles. John L. Milton is the general manager.

The Jones Motor Car Company, Wichita, Kan., has completed its plant at 210 West Douglas avenue. The company manufactures the Jones Six car.

The Pendleton Manufacturing Company, Culver City, Cal., has installed new machinery at its plant, where it manufactures a small light car.

The Chevrolet Motor Car Company, Flint, Mich., is looking up a location in that city for the purpose of establishing a service station for automobiles.

The Fisk Tire and Rubber Company, Duluth, Minn., is planning to establish a factory branch and will locate in the Dodge block.

The Castle Rubber Company, New Castle, Penn., capitalized at \$500,000, has been organized to manufacture a non-skid tire and tubing and later will add other articles to its product.

The Continental Motor Manufacturing Company, Muskegon, Mich., will erect a plant in that city. The new building will connect the annex with the main factory and will be used as a machine shop. The plant in Detroit is running at full capacity.

The Hudson Motor Car Company, Detroit, Mich., according to statements given out at the New York show, made a sales record of \$7,500,000 in the five months between July 1 and Dec. 1, 1914. This aggregate of sales compares with \$3,000,000 in the same period of a year ago and is an increase of 150 per cent.

The Champion Spark Plug Company, Toledo, O., held its annual salesmen's convention in Detroit, Mich., recently. The entire sales force visited the King factory and the Jeffery-DeWitt plant and later were guests of the Ford Motor Company.

The Hupp Motor Car Company, Detroit, Mich., is building additions to its factory to cost upwards of \$150,000. A two-story office building, a top and body building, a testing laboratory and an engineering building are the new additions.

The Triple Action Spring Company, Chicago, Ill., manufacturer of the Johnson shock absorber, has been awarded the order for the entire equipment of the Walker Vehicle Company, maker of the Chicago electric car.

The Willys-Overland Company, Toledo, O., is distributing a catalogue de luxe showing its new Overland six, model 82.

The Gearless Differential Company, Detroit, Mich., has elected the following officers for the coming year: President, George D. Bailey; vice president, C. F. Ferguson; secretary and treasurer, E. O. Knight. The directors are: George Stroh, A. MacLaren, H. H. Bailey and John Schrag.

The Federal Motor Truck Company, Detroit, Mich., has awarded its employees a bonus of 10 per cent. of their wages for the past year as a share in the profits of the company.

The Thermoid Rubber Company, Trenton, N. J., has issued a folder devoted to the Thermoid hydraulic compressed brake lining. A scale of prices is given for the various widths and thicknesses.

The Bergdoll Automobile Company, Philadelphia, Penn., will erect a large manufacturing plant at Trenton Junction, N. J.

The Magee Sheet Metal Machinery Company, Detroit, Mich., will manufacture sheet metal wiring machines especially used in wiring fenders. Several sample machines have been tried out by one of the largest automobile manufacturers, and it is said its use has resulted in the saving of more than \$40 a day.

The Revivo Storage Battery Company, Louisville, Ky., was organized recently to manufacture a dry storage battery, designed to displace the acid battery of all classes, which it is said can be recharged indefinitely. R. M. Kelly, Jr., has been elected president of the company.

The Zenith Carburetor Company, Detroit, Mich., has been elected to membership in the Motor and Accessory Manufacturers.

The Duplex Power Car Company, Charlotte, Mich., which makes the Duplex four-wheel drive trucks, has received an order for 12 two-ton trucks from the United States government.

The Lyons-Atlas Company, Indianapolis, Ind., has increased its capital stock from \$1,000,000 to \$1,500,000. The company is preparing to market a new medium-priced car, experiments on which have been under way for several months.

The McGraw Tire and Rubber Company, East Palestine, O., is making extensive improvements to its plant on Taggart street. The increased business necessitates this step.

The Remy Electric Company, Anderson, Ind., has purchased a tract of land on East Grand boulevard, Detroit, Mich., which has a frontage of 500 feet. A new building will be erected which will have 20,000 feet of floor space and will be three stories high.

The Saxon Motor Car Company, Detroit, Mich., has secured a five-year lease on the Abbott Motor Car Company's factory on Beaufault avenue, and will occupy it as soon as alterations are made.

SUGGESTIONS FOR THE NEW CAR OWNER.

The "Sun and Planet" Type of Steering Gear, Its Construction and Operation, with Special Reference to the Model T Ford Car.

The 17th article of the series dealing with the construction, operation, care and repair of the model T Ford automobile, describes the steering gear.

IN THE last article the front axle assembly and the linkage of the steering gear were described and illustrated. It was explained that

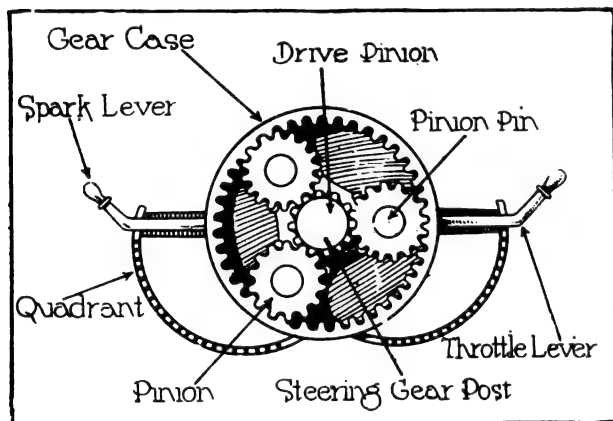


Fig. 34—Illustrating the "Sun and Planet" Gears Utilised in the Steering Gear Assembly of the Ford Car.

the front wheels are actuated by a steering gear connecting rod having one end attached to the right hand spindle. The other end of this rod is connected with the steering gear ball arm, which is shown at Fig. 35 B. The ball arm is keyed and locked to the steering gear post, obtaining practically a solid construction. As this rod is subjected to certain stresses, it is an important component of the assembly.

The post is an all-metal construction and is rotated a certain number of degrees, the movement being limited by that of the front axle assembly. The steering post is set at an angle so as to bring the wheel in a position convenient for the operator to grasp with his hands, and the column is supported by the tube assembly shown at Fig. 35 A. This tube is of metal, having an inside diameter sufficiently large to permit of easy movement of the post, and to carry the spark and

throttle rods convenient to the operator.

The tube is substantial and its base is flared at right angles. The base is secured to the dash by means of bolts, and when these are tightened there is but little movement to the assembly, particularly that section attached to the dash. If the steering wheel be used as a support when entering or leaving the car, a practise indulged in by many owners, there will be more or less bending of the assembly and there will be a tendency for the bolts retaining the base to the dash to work loose. The steering wheel should never be used in this manner.

How Wheel Is Secured.

The steering column is surmounted by the wheel, which is at right angles to the post. The wheel proper comprises what is termed a spider, a metal construction comprising four arms. The outer portions of these arms are utilized to secure the rim, which is of wood. These arms converge to a point in the centre of the spider and in this portion is drilled a hole slightly less in diameter than that of the post, so that when the spider is fitted to the column what is termed a drive fit will be obtained. A keyway or slot is cut in the spider, in which is fitted a key which prevents the spider from turning on the shaft. Consequently, any movement or turning of the wheel causes the steering post to rotate.

The Ford steering gear differs radically from

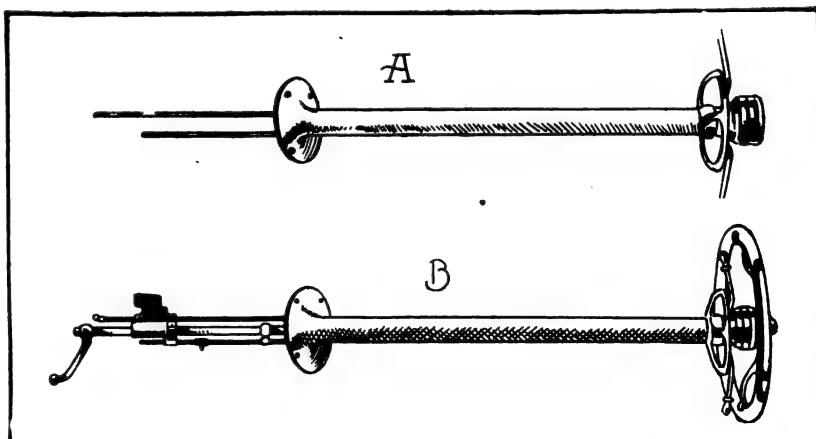


Fig. 35—The Steering Gear Assembly of the Ford Car; A, Showing the Tube and Pull Rods; B, the Components Completely Assembled.

the conventional types, in that the gears actuating the column are located at the top of the post, whereas in other designs they are placed at the base of column. The gearing employed is termed by the maker the "sun and planet" type, and was first brought out by the company in its six-cylinder car, which model has been discontinued.

This type of steering gear has proven very efficient as the planetary form of gearing makes for easy steering, and the parts are simply constructed. The components are contained in a compartment having a removable cover and, operating in grease in a dust proof housing, require little if any attention other than replenishing the supply of lubricant.

The "sun and planet" gears referred to are shown at Fig. 34. The drawing depicts the gear cover displaced, and as the components are lettered the operation should be easily grasped. As may be noted there are four gears, one in the centre and three surrounding this member. The outer gears are in mesh with the central member which, when it is rotated by the spider and wheel, not only turns the steering post, but the outer gears. The last-named gears rotate around the centre pinion and because of this movement the assembly is termed the "sun and planet", the pinion representing the sun and the other gears the planets.

Operation of Gears.

As may be noted the outer gears mesh with a ringed gear on the inner side of the gear cover. These outer gears are movably mounted on a pin, and are free to rotate in either direction. When the steering wheel is turned to the right, for example, the three outer gears rotate in the opposite direction, travelling around the centre pinion.

Fig. 34 illustrates the quadrants over which move the spark and throttle levers which control the operation of the commutator and the throttle of the carburetor. These quadrants are notched, and the levers are provided with teeth which engage in these notches. This construction is necessary, especially with the linkage of the timer, for the movement or rotation of the commutator has a tendency to move the rods connecting the timer with the spark lever. The notches in the quadrant also enable the operator to graduate the throttle opening of the carburetor, and those on the spark side are of value when starting the motor, as it insures the placing of the lever at full retard or a position preventing a too early ignition of the charge when starting the motor.

The levers are a part of the rod extending

through the steering tube, and are plainly shown at Fig. 35 A. At B are seen the rods and how they pass through the steering post bracket previously described. Attached to the rods are what are termed the lead rod levers, to which are joined the rods connecting the main members with the timer and the carburetor throttle. Ball and socket joints permit movement of the linkage between the long rods and those connecting with the timer and carburetor. (To Be Continued.)

STUDYING CONVICT LABOR QUESTION.

Road work for misdemeanor prisoners is the subject of an investigation which is being conducted under the joint direction of the national committee on prisons and prison labor and the graduate highway department of Columbia university. James Leland Stamford, B. S., C. E., who is in charge of the investigation, has had considerable experience in the road camps of Georgia, where the majority of able-bodied male prisoners are worked on the roads.

The study will consider in detail such matters as the most economic size of a road gang, the cost for guarding, supervising and maintenance, and the approximate value of a day's work. It will also show the possibility of increasing efficiency by means of the payment of wages, recreation after work hours, and the shortening of sentence for good conduct. Conditions in the different sections of the country are to be dealt with, especially as to the effect of weather conditions and the cost of stock.

Idleness prevails in many county institutions, while in others the work is not of value either to the prisoners or to the county. In Kalamazoo county, Mich., and other counties where road work has been tried, even under experimental conditions, it has been found eminently successful. In fact, the knowledge that a jail sentence will mean hard work on the roads has a tendency to decrease the number of commitments, vagrants keeping away from counties where they will be subjected to work of this character.

Already much valuable material has been gathered and, by the time the study is completed, information will be at the disposal of all counties undertaking convict road work, which will enable them to conduct it in a scientific manner. The national committee on prisons and prison labor hopes in this way to lessen the evils of the county jail and to benefit both the prisoners and the counties through the impetus which will be given to the building of good roads.

LO ACONTECIDO EN INDIANAPOLIS.

Shortly after the fourth annual 500-mile International sweepstakes race at Indianapolis, 1914, hundreds of garages, automobile supply houses and hardware dealers displayed the poster, "What Happened at the Indianapolis Speedway". This poster carried the message of the remarkable fact that 40 of the 45 entrants, 25 of the 30 who qualified, and nine of the 10 winners of this race, used Dixon's graphite automobile lubricants, made by the Joseph Dixon Crucible Company, Jersey City, N. J. Pictures of the first three winners, as will be noted in the accompanying illustration, were also displayed.

So popular did this poster become that the Dixon Company, upon request of its South American representative, Alfredo J. Eichler, de-

geles and Pueblo, Col., and the completion of the work over the North and South highway through Colorado to its junction with the Lincoln highway at Big Springs, Neb., also along the route from Trinidad to Kansas City, Mo., is a matter of but another six or eight weeks' work.

"The truck has been steadily at work since Aug. 20, the date of its departure from Los Angeles, and has met some trying conditions.

"During the past 4½ months in which the truck has worked on this project, it has crossed 2000 miles of desert and mountainous country. Two complete sets of specially made 1½-inch skid chains have been completely worn out, heavy rains in eastern Arizona and New Mexico, and snow, ice and freezing ground later on necessitating their almost constant use. In spite of this fact the original set of Goodyear tires is still in use on the truck.

"The writer does not believe that a more severe test has ever been given either tires or truck than in this case, and we cannot compliment you too highly on the satisfactory results which we have obtained from the use of your tires on this outfit.

"It is now practically assured that we will be able to carry on the work from Kansas City to New York, via the National Old Trails road, including therein the sign posting of another feeder route leading from the National Old Trails to Chicago; this work to be undertaken on the completion of the work to Kansas City. It is our purpose to use the same outfit, crew and type of signs all the way through, and the great interest already shown in all sections of

the country, indicates that there will be greatly increased travel resulting from the work which we are doing".

TAKES AUSTRALIA'S TRUCKS.

Under compulsory orders the government has bought up every truck in Australia suitable for war purposes. It is estimated that a total of 260 trucks have been turned over to the government for shipment to the scene of war, and merchants are hard pressed for means to transport their goods. The light delivery type will undoubtedly come into vogue to a greater extent in that country, and an excellent opportunity is presented to the American manufacturer.



The Poster Used Effectively by the Joseph Dixon Crucible Company in United States and South America.

cided to reproduce it in Spanish, with the result shown herewith. Mr. Eichler has used the poster in many window displays of prominent South American automobile supply houses.

HARD TEST FOR GOODYEAR TIRES.

In a letter to the Goodyear Tire and Rubber Company, Akron, O., C. E. McStay, special representative of the Automobile Club of Southern California, tells of a hard test that proved Goodyear tires to be all that they are claimed to be. Mr. McStay's letter is as follows:

"The combination of Goodyear tires and the 'Made in Los Angeles' truck has enabled this organization to complete the thorough sign posting of the National Old Trails road between Los An-

NEW YORK GARAGE MEN WIN BIG FIGHT.

LAST summer saw a number of states preparing laws and regulations that were more or less adverse to the best interests of the garage owner. In New York State the fight between Fire Marshal Thomas J. Ahearn and the garage men on the separator question became bitter to the extreme, and the final outcome has resulted in a complete victory for the garage men—in fact, so complete that the office of New York state fire marshal has been abolished. This act has the indorsement of Governor Whitman, and it is needless to say that it meets with the approval of the garage interests of the state.

The abolition of the office ends a successful fight which has been carried on for the past several months by R. H. Johnston of the White Company, New York City, who headed the Automobile Trade Association of New York State. Charles Thaddeus Terry was the attorney for the organization and Charles A. Stewart is the secretary. At the request of the association the rules, which applied to all cities in New York State with a population of 1,000,000 and over, were suspended indefinitely, pending an investigation and a proposal to redraft and make them feasible and fair.

Assemblyman Hinman contended that the fire marshal's office represents "excess baggage".

The measure, which means so much to the garages of New York, as submitted by Assemblyman Hinman, was exceedingly short. It is quoted in full in the following:

AN ACT.

To repeal article 10-a of the insurance law, relating to the state fire marshal, and acts affecting the application of such article, to terminate the powers, duties and office of the state fire marshal and provide for the care and records of his office.

The people of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. Article 10-a of chapter 33 of the laws of 1909, entitled "An act in relation to insurance corporations, constituting chapter 28 of the consolidated laws", as added by chapter 451 of the laws of 1911 and amended by chapter 453 of the laws of 1912 and chapters 192, 204, 214, 303, 393, 405, 431, 432, 433, 434, 520 and 523 of the laws of 1913, and comprising sections 350 to 375 inclusive, and sections 377 to 379, inclusive, is hereby repealed and the office of state fire marshal and all offices and positions therein abolished. All property, books, papers, records and documents pertaining to the office, powers and duties of state fire marshal in the possession or control of such officer or his subordinates, shall be delivered on demand to the director of the state library and by him kept and preserved until otherwise provided by statute.

2. Section 2 of chapter 453 of the laws of 1912, entitled "An act to amend the insurance law, in relation to state fire marshal", is hereby repealed.

3. This act shall take effect immediately.

After successfully defeating the proposed separator law for New York garages, the Automobile Dealers' Association, headed by R. H. Johnston of the White Company, New York City, sought to have the "50-foot garage law" repealed. At a hearing before the Board of Hazardous Trades, President Johnston and others of the association addressed the members and requested that the rule be repealed or made less drastic. The law states that no garage allowing the storage of any volatile inflammable oil shall be permitted within 50 feet of the nearest wall of a building occupied as a school, theatre, or other place of public amusement or assembly.

It was contended by President Johnston that a garage is less hazardous than many other supposedly "safe" buildings, and that were the rule to be rigidly enforced it would unjustly put many garage men out of business. Points made by the dealers at the hearing were summarized as follows:

1. Modern garages are fireproof.
2. Gasoline storage systems are fireproof.
3. Modern gasoline is less volatile than in the early days of the industry.
4. Gasoline is less explosive than commonly believed.
5. Many supposedly "safe" materials are just as combustible as gasoline.
6. Wood takes fire at a lower temperature than gasoline.
7. Garages contain less combustible material than many buildings classed as "safe".
8. There are employees in a garage 24 hours a day, lessening the fire hazard.
9. A garage should be a preferred not a condemned neighbor.
10. The regulation does not lessen the possibility of panic.
11. The regulation acts as a deterrent to garage erecting; business men will not build if a "movie" man can open up next door and force them out of business.

In the course of his lengthy report, President Johnston says: "It is my earnest hope, as it is my expectation, that this board will forthwith repeal the regulation complained of. The fact that the board has granted us this hearing shows that it is willing to consider the merits of the regulation, and I trust that the facts presented have been sufficient to convince them that the regulation should not be allowed to remain on the statute books for another day.

"This regulation embodies a most unusual and extraordinary principle, namely, that the use to which an owner may put his property is limited by the character of adjoining property. This extraordinary discrimination against the garage, as such, can be justified only on the ground that the garage is an extraordinary hazard and is more dangerous to adjacent property than any other class of structure whatsoever.

"We believe that any prejudice which may exist to the effect that the garage is a particularly hazardous structure must date back to the garages as conducted in the early days of the industry. At that time there might have been some justification for such a regulation as we now ask you to repeal, but the conditions which existed in those early years no longer exist.

"The modern automobile is practically fool proof in its operations and it is certainly leak proof. The barrel of gasoline has been banished from the garage. In its place every garage in New York City has installed a system of underground storage which is as safe as the ingenuity of man can devise. There has never been an explosion of an underground gasoline tank. In fact, such an explosion is impossible for reasons which will be later set forth. In the few garage fires which have occurred in this city, there has not been a single case where the gasoline in the underground tanks was consumed.

"In filling automobiles, gasoline is drawn by pumps from the underground tanks into portable tanks or, in a very few instances, into safety cans. From the portable tank it is pumped directly into the tank of the automobile, or from the safety can it is poured into the tank of the automobile. In neither case is the gasoline exposed to the open air nor is there any chance for any to drip upon the floor if the most elementary precautions are observed. The result is that, in a well conducted, up-to-date garage, there is not even an odor of gasoline".

RECENT PATENTS.

Valve Mechanism, William Arter, Worcester, Mass., assignor of one-half to B. E. Delle; No. 1,126,679. Filed Jan. 22, 1913.

Speedometer, H. D. Ball and John I. Floyd, Beloit, Wis., assignors of one-fourth to H. R. Gray and one-fourth to J. F. Murray; No. 1,126,683. Filed March 21, 1914.

Carburetor, Thomas Beucus, Cedar Springs, Mich.; No. 1,126,690. Filed April 6, 1914.

Rotary Valve, H. C. Coffin, Detroit, Mich.; No. 1,126,706. Filed May 4, 1914.

Internal Combustion Motor, G. B. Collier, Kinderhook, N. Y.; No. 1,126,708. Filed March 23, 1912.

Engine, H. T. Crew, Shreveport, La., assignor of one-half to W. B. Simpson; No. 1,126,713. Filed June 17, 1913.

Engine, G. E. Dick and R. M. Bigler, Chippewa Falls, Wis.; No. 1,126,723. Filed June 9, 1913.

Valve Grinding Apparatus, M. B. Durga, Centralia, Wash.; No. 1,126,735. Filed Sept. 24, 1914.

Internal Combustion Engine, E. F. Entwistle, Duquesne, Penn.; No. 1,126,738. Filed Aug. 7, 1912.

Deflating Tool for Tires, W. J. Faulkner, Russellville, Ark.; No. 1,126,743. Filed Aug. 31, 1914.

Milling Attachment for Lathes, James Hogarth, Deadwood, S. D.; No. 1,126,763. Filed Jan. 9, 1913.

Automobile Lock, T. J. Kehoe, Toledo, O.; No. 1,126,781. Filed May 12, 1913.

Focussing Socket, G. C. Knauff, Chicago, Ill.; No. 1,126,786. Filed Aug. 11, 1914.

Spring, O. M. Nacker, Detroit, Mich., assignor of one-half to A. P. Brush; No. 1,126,832. Filed June 15, 1914.

Tire, H. S. Nunamaker, Cleveland, O.; No. 1,126,840. Filed Sept. 25, 1915.

Nut Lock, F. J. Pardini, Carson City, Nev.; No. 1,126,847. Filed April 21, 1914.

Connecting Rod, G. W. Seaman, Mansfield, O., assignor to Aultman & Taylor Machinery Co.; No. 1,126,888. Filed June 4, 1914.

Fender, Martin Soldati and F. J. Klass, Willows, Cal.; No. 1,126,897. Filed July 31, 1914.

Platen Packing Ring, E. A. Sorenson, Whitehall, Wis.; No. 1,126,898. Filed May 28, 1914.

Spark Plug, F. M. Furber, Revere, Mass., assignor to A. R. Mosler; No. 1,126,974. Filed July 5, 1913.

Driving Mechanism, R. E. Hamilton, Detroit, Mich.; No. 1,126,992. Filed April 29, 1912.

Rotary Valve, J. O. Heinze, Jr., Detroit, Mich., assignor to the General Motors Company; No. 1,126,998. Filed June 18, 1912.

Engine Governor, Emil Kagi, Winterthur, Switzerland, assignor to Busch-Sulzer Bros. Diesel Engine Company; No. 1,127,012. Filed Sept. 21, 1914.

Shock Absorber, H. B. Kelper, Lancaster, Penn.; No. 1,127,016. Filed May 8, 1914.

Motor Starter, C. E. L. Lipman, Beloit, Wis., assignor to Lipman Air Appliance Company; No. 1,127,036. Filed July 5, 1912.

Tire, A. W. Livingston, Oakland, Cal., assignor to Standard Steel Wheel and Tire Armor Company; No. 1,127,038. Filed Sept. 22, 1915.

Tire, W. H. Nance, Ottawa, Kan., assignor of one-half to E. Pember; No. 1,127,077. Filed Jan. 30, 1914.

Air Compressor, Frederik Nielsen, Boston, Mass.; No. 1,127,079. Filed Feb. 23, 1912.

Carburetor, C. H. Veeder, Hartford, Conn., assignor to the Veeder Manufacturing Company; No. 1,127,120. Filed April 29, 1911.

Safety Pressure Device, W. H. Walter, New York City; No. 1,127,128. Filed Feb. 20, 1914.

Spring Wheel, C. L. Andersen, East Chicago, Ill., and Lloyd M. Kniffin, Hammond, Ind.; No. 1,127,154. Filed Aug. 13, 1914.

Automobile Sleigh Runner, C. E. Anderson, Duluth, Minn., assignor of one-half to L. A. Larsen; No. 1,127,157. Filed April 16, 1914.

Valve Seat Refacing Tool, J. W. Brooks, Stamford, Conn.; No. 1,127,175. Filed May 19, 1914.

Ignition Apparatus, R. H. Cunningham, New York City; No. 1,127,197. Filed July 13, 1912.

Lever Locking Device, J. A. Deyoung, West New York, N. J.; No. 1,127,203. Filed Aug. 22, 1913.

Motor Starter, W. H. Enders, Sacramento, Cal.; No. 1,127,212. Filed Jan. 12, 1914.

Motor Starter, Karl Fellner, Nuremberg, Germany;

No. 1,127,218. Filed April 25, 1913.

Tool for Demountable Rims, C. C. Harbridge, Detroit, Mich., assignor to the Detroit Demountable Rim Company; No. 1,127,236. Filed July 24, 1914.

Safety Device for Motor Vehicles, Percy Haworth, Earlsfield, England, assignor to C. B. Burdon; No. 1,127,241. Filed Oct. 22, 1913.

Holder for Starting Cranks, V. A. Johnson, Detroit, Mich.; No. 1,127,257. Filed May 21, 1914.

Internal Combustion Engine, C. C. Longard, Halifax, N. S., Canada; No. 1,127,265. Filed April 13, 1914.

Spring Wheel Construction, A. V. Mitchell, Washington, D. C.; No. 1,127,271. Filed Oct. 17, 1913.

Carburetor, E. F. L. Russell, Denver, Col., assignor by mesne assignments of one-half to Ella E. Russell; No. 1,127,286. Filed June 23, 1911.

Lifting Jack, F. W. Shaw and Richard Bottorf, Cleveland, O.; No. 1,127,294. Filed Nov. 1, 1912.

Automobile Door Bumper, L. W. Wegenka, South Bend, Ind.; No. 1,127,329. Filed June 15, 1914.

Spark Plug, J. G. Westbrook, Ogdensburg, N. Y.; No. 1,127,330. Filed Sept. 25, 1913.

COMING EVENTS.

February.

Feb. 8-13—Show, Toledo, O.
Feb. 8-13—Show, Peoria, Ill.
Feb. 8-14—Show, Troy, N. Y.
Feb. 8-15—Show, Kansas City, Mo.
Feb. 8-15—Show, Wilmington, Del.
Feb. 9-12—Show, Eau Claire, Wis.
Feb. 10-13—Show, Davenport, Ia.
Feb. 15—Show, Fort Wayne, Ind.
Feb. 15-20—Show, Bridgeport, Conn.
Feb. 15-20—Show, Omaha, Neb.
Feb. 15-21—Show, Grand Rapids, Mich.
Feb. 16-18—Show, Bloomington, Ill.
Feb. 18-20—Show, Racine, Wis.
Feb. 22—Vanderbilt Cup Race, San Francisco, Cal., Panama-Pacific Exposition grounds.
Feb. 22—Hill climb, Light Car Club. Teaneck, N. J.
Feb. 22-25—Show, Allentown, Penn.
Feb. 22-27—Show, South Bethlehem, Penn.
Feb. 22-27—Show, New Haven, Conn.
Feb. 23-27—Show, Fort Dodge, Ia.
Feb. 23-27—Show, Syracuse, N. Y.
Feb. 23-27—Show, York, Penn.
Feb. 24-27—Show, Anderson, Ind.
Feb. 24-27—Show, Freeport, Ill.
Feb. 27—Grand prize race, San Francisco, Cal., Panama-Pacific Exposition grounds.

March.

March 1-5—Show, Wilkes-Barre, Penn.
March 3—Convention of Associated Garages of America, Albany, N. Y.
March 4-6—Show, Springfield, Mass.
March 6-13—Show, Mechanic's Building, Boston.
March 8-13—Show, Canton, O.
March 8-13—Show, Utica, N. Y.
March 8-15—Show, Des Moines, Ia.
March 13-20—Show, Harrisburg, Penn.
March 14—Panama-Pacific cup race, San Francisco, Cal., Panama-Pacific Exposition grounds.
March 17—Road race, Venice, Cal.
March 22-27—Show, Bangor, Me.

April.

April 3—Show, Paterson, N. J.

May.

May 17-18—A. A. A. annual meeting, Boston, Mass.
May 29—500-mile race, Indianapolis, Ind.

June.

June 9—Track meet, Galesburg, Ill.
June 16—500-mile race, Chicago, Ill.
June 25—Track meet, Sioux City, Ia.

July.

July 4—Road race, Tacoma, Wash.

August.

Aug. 20-21—Road race, Elgin, Ill.

RIGOROUS TEST FOR COLE EIGHT.

The Cole eight-cylinder model, made by the Cole Motor Car Company, Indianapolis, Ind., fresh from seven days of triumph at the Chicago automobile show, has returned to the company's plant. The car was accompanied by Chief Engineer Crawford, who has scarcely left its side since the last touch was given in the final assembly just prior to the Chicago show. However, the new model will not be permitted to rest on its laurels. J. J. Cole, president of the Cole Company, says that this particular production is to undergo the most rigorous series of road and track tests to which any Cole product has ever been subjected. The first completed car, it is said, will be tested for economy on the Indianapolis speedway, and for hill climbing ability on the hills of Brown county, Indiana, Pittsburg and Cincinnati.

According to Charles S. Crawford, chief engineer of the Cole Company, the Cole eight is an absolute and unquestioned success. He says: "The Cole production in the past has been extremely satisfactory from a mechanical standpoint, but this present Cole eight is the sweetest car I have ever worked out. There is no gainsaying the correctness of eight-cylinder construction. Some of the most conservative builders in the industry have established this fact. The Cole eight-cylinder motor is not an experiment, more than 12 months having been consumed in its production. This motor is the largest eight on the market, and its most conspicuous advantage, aside from the general advantages of an eight, lies in its extreme accessibility. Its cylinder heads are removable, and there is not a nut or bolt or a single part of its construction which cannot be gotten at with absolute ease".

WILL CUT COST OF GASOLINE.

Superintendent Fred H. Clark, of the department of streets and engineering, Springfield, Mass., has installed a 10,000-gallon gasoline tank to supply the 18 automobiles under his charge. By thus making possible the purchase of fuel in carload lots, Mr. Clark figures he saves at least \$500 a year in his department, which will be sub-

stantially increased if other cars belonging to the city are supplied, as is now contemplated.

EAGLE-MACOMBER PACKET CAR.

The Eagle-Macomber Motor Car Company, Chicago, Ill., manufacturer of the Eagle light car, which is equipped with a Macomber rotary engine, announces a light delivery packet car. The delivery body is mounted on the same chassis as the pleasure car, and, of course, the specifications are the same throughout. The Macomber rotary motor is an air cooled, five-cylinder design, having a bore of 2 9/16 inches and a stroke of three, giving it 12 to 14-horsepower rating.

In the packet car the merchant who desires to make quick and efficient deliveries will find his requirements fully answered in the Eagle-Macomber packet car. The motor and chassis have



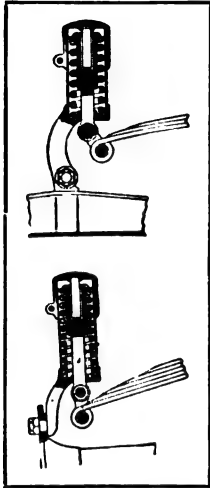
The Eagle-Macomber Cyclecar with Standard Commercial Body Attached.

been subjected to severe road and laboratory tests, and their utility from a practical standpoint has been demonstrated in every respect. This is especially true of aeroplane and motor boat service. It is claimed that the mechanical efficiency and power of the Macomber are about 30 per cent. greater than that of a reciprocating engine of similar rating, and that it has shown 82.6 per cent. efficiency in laboratory tests.

A factory branch has been opened in San Francisco by the General Motors Truck Company, Pontiac, Mich., to handle the increased coast business. In order to accomplish this the General Motors Truck Company took over the business of the Pioneer Motor Truck Corporation, heretofore the coast distributor for the GMC.

NEW O. G. SHOCK ABSORBER.

The Oxygen Generator Company, Inc., 301 River street, Troy, N. Y., has brought out a new shock absorber which is designed particularly for the model T Ford touring, roadster and delivery car. The device affords an extra large amount of spring action, and the arrangement of the double springs is such that both the compression and rebound of the car springs are absorbed. The O. G. shock absorbers have been thoroughly tried out under the most severe conditions, the tests lasting over six months. They come in sets of two or four and are moderately priced. The O. G.'s are adaptable to the front and rear springs of the Ford, and the accompanying illustration shows them fitted to the machine. The upper illustration shows the type employed on the front springs and the lower is the device for the rear springs. Details and prices will be supplied upon request.



The O. G. Shock Absorbers for Ford Cars.

LOCOMOBILE FOR ROYALTY.

The Locomobile Company of America, Bridgeport, Conn., has just completed an automobile for a Japanese peer, Prince Fushimi, of the royal family. It is a six-passenger of the berlin type, and has features especially arranged for this aristocratic customer, being constructed at a cost of \$7000.

AUTOMOBILES AND PROSPERITY.

Every dollar expended in motor cars is just so much money contributed to the general prosperity of the country, declares John N. Willys, president of the Willys-Overland Company, Toledo, O. "Every automobile purchased means that hundreds of people are profiting by the investment. The conversion of raw material into finished cars and parts is putting millions of dollars every month into the pockets of machinists, foundrymen, trimmers, assemblers and other master workmen. These men in turn are handing over their money to the butcher, the baker, the grocer, the merchant and the banker.

"Figures as to the number of men who gain a

livelihood through this single industry are not available because of the various allied trades involved. But there are garage men, salesmen, tire makers, manufacturers of accessories and electrical equipment, leather merchants, steel men and the makers of other products who, with an enormous army of employees, profit directly or indirectly by the manufacture and sale of cars".

HOTEL TAFT TO BE HEADQUARTERS.

Permanent headquarters for the Automobile Club of New Haven, Conn., will shortly be established at the Hotel Taft, that city. The room selected will be located on the mezzanine floor of the hotel, within easy access.

"GENERAL GRANT" DRIVES GRANT.

When the press agent for "The Littlest Rebel" and the publicity man of the Southwest Motor Company, Kansas City, Mo., pooled their ideas recently, they evolved something really worth while. After E. J. Blunkall, leading man of the "Rebel" Company, had finished his speaking part at the matinee, he retained his full make-up and uniform used in the portrayal of General Grant and stepped into the Grant roadster waiting at the stage door. Kansas citizens stared in amazement as the wonderfully appropriate outfit whizzed up hill and down. They hadn't seen General Grant since he campaigned for president and were naturally surprised at his turning up behind the wheel of a motor car.

The Southwest Motor Company sells Grant



Leading Man of "The Littlest Rebel" Company at the Wheel of a Grant Car. Impersonating the Famous War Hero of That Name.

fours and sixes in Kansas City, and it was agreed that both the General and the car had something in common—lots of "pep".



BUILT without valves or springs or cams, the Zenith has no variables.

With its compound nozzle and extreme simplicity it can be forgotten when once set correctly. Fool proof and trouble proof—lasting forever—the Zenith is by far the wisest buy in the field of carburetion. Ask for a catalog and get posted.

Fitting Air to Close Limits

EVEN air is measured and held to a standard in building the famous Zenith. The venturi tube or air nozzle is important, for through it must pass the demands of the motor.

These nozzles are quickly tested by the ball gauge. One end of the gauge says "Go" and the other end "No Go"—a difference of but plus or minus 2,000ths of an inch. The "Go" end must slip through the nozzle; the "No Go" end must not. Thus even the air which passes through the Zenith must conform to limits. The results obtained from each Zenith are identical. There is no element of chance. All is known.



ZENITH CARBURETOR CO. DETROIT, MICH.

EISEMANN

The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.

The Eisemann Magneto Company

Sales and General Offices,
32-33d St., Brooklyn, N. Y.

New York, N. Y. Indianapolis, Ind. Detroit, Mich.
123 W. 52nd St. 514 N. Capitol Av. 802 Wd'v Av



PAIGE "36"—\$1195 "25"—\$ 925

Leaders of popular-priced cars—thoroughly built, completely equipped, backed by a strong organization. Specifications and catalog on request.

PAIGE-DETROIT MOTOR CAR CO.
Detroit, Michigan

The Easiest Riding
Car in the
World

MARMON

F. E. WING
562 Commonwealth Ave.
BOSTON, MASS.

New England Dealer for

NORDYKE & MARMON CO., Indianapolis, Ind.

MARMON "41"
\$3250

132" Wheelbase

MARMON "48"
\$5000

145" Wheelbase

VALVOLINE OIL CO.

Heavy, Medium and Light

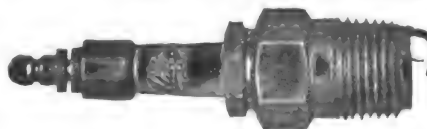
Automobile Oils

27 STATE STREET BOSTON, MASS.

Subscribe for

The Accessory and Garage Journal
The Trade Authority \$2.00 the year

ALDING PORCELAIN PLUGS

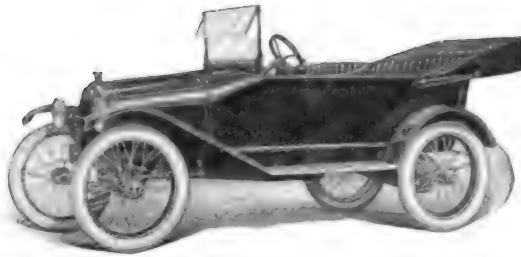


Regular
75c Value

50c
EACH

Write for a gallon of the famous
"ALDING" OIL in "DUCK" Can. 75c Delivered
ALSTEN & GOULDING COMPANY
36 Foster Street, Worcester, Mass.

When Writing to Advertisers, Please Mention The Automobile Journal.



METZ "25"

The Quality Car

\$600 Touring Model, Equipped Complete, Including Gray and Davis Electric Starter and Electric Lights.

A man's car, every inch of it; but it pleases the ladies, too. It has the style and the luxurious finish which they so much admire, and is so simple in operation that they can safely drive it.

In addition to electric equipment, other features include rain vision windshield, instant one-man top, heavy tufted upholstery, deep cushions, 32" wheels, 3½" Goodrich clincher tires, fibre grip gearless transmission, Bosch magneto, Hyatt roller bearings, speedometer, gasoline gauge, etc., etc.

We want to hear from dealers. Write for particulars and new catalog "Q."

METZ COMPANY,

WALTHAM, MASS.

Trade Names

All Industrial names ready at instant notice. All lines separate.

The Most Complete List of Trade Names Known

100% ACTIVE

Write for particulars

ACCESSORY AND GARAGE JOURNAL

Times Building, Pawtucket, R. I.



The New Gearless Transmission Cartercar for 1915

Model Nine

Driven by "Wheel and Disk"—with 12 years of success behind it. New Streamline Body. Delco Electric System Starting and Lighting. Full Equipment. Big Tires. Roomy.



Some Territory Open, Deliveries at Once, Get Busy Write for our proposition and "The Transmission Tells the Story"

Cartercar Company Pontiac Michigan **\$1,250**

BOSTON SHOW NUMBER The Automobile Journal

MAILED

February 27, 1915

RESERVE SPACE NOW.

For Perfect Control and Safe, Comfortable Driving use

Weed Anti-Skid Chains

At all Reputable Dealers
Weed Chain Tire Grip Co., New York

THE MOTOR TRUCK

A Recognized Authority in the Commercial Vehicle Field

12 ISSUES

\$2.00 THE YEAR

"Don't Gamble With Safety"

Demand the Improved, Guaranteed

S-M-C Asbestos Brake Lining

Sold by all dealers or direct by manufacturer
STAYBESTOS MFG. CO. Germantown, Philadelphia, Pa.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Write today for
our Territorial Agree-
ment on the New

\$1,000

Inter-State
"FOUR"

The ONE popular priced car with
the greatest selling arguments
in the country.

INTER-STATE MOTOR CO.
894 W Willard St.,
MUNCIE, IND.



WHY USE INFERIOR PLUGS WHEN CENTERFIRE

can be bought at the same price? They over-
come all Engine troubles, fire where others
fail and Add Power to engine. Any length
point desired made to order. Try them and
you will use them—always. Make a trial and
save money. \$1.00 each, 6 for \$5.00.

GUARANTEED

Agents wanted and special prices to dealers.

Milwaukee Auto Specialty Co.
705-707-709-711 Chestnut St., Milwaukee, Wis.

20,000 GUARANTEED

When you have anything to say to those in the auto-
mobile industry use straight trade talk copy in the

Accessory and Garage Journal

The only strictly automobile trade paper published
in America

Automobile Journal Publishing Co.

Publishers

AUTOMOBILE JOURNAL **MOTOR TRUCK**
Times Building, Pawtucket, R. I.

Tarvia

**PREVENTS DUST
PRESERVES ROADS**

Booklets on request

BARRETT MANUFACTURING CO.

New York, Chicago, Philadelphia, Boston, St. Louis, Cleve-
land, Pittsburg, Cincinnati, Kansas City, Minneapolis, Seattle,
Birmingham, Ala.



Studebaker

FOUR Roadster, \$985 **SIX** 5-passenger Touring Car, \$1385
FOUR Touring Car, \$985 **SIX** 7-passenger Touring Car, \$1450
All models electrically started and lighted and completely equipped.
STUDEBAKER - **DETROIT, MICH.**

(When Writing to Advertisers, Please Mention The Automobile Journal.)

90% of All Automobile Manufacturers Recommend

TRADE MARK REGISTERED IN
NON-FLUID OIL
SAFETY OIL

As they are not oil dealers they can
have but ONE object in recommend-
ing it—that of having their cars operate most
efficiently and last longest in service. NON-
FLUID OIL insures this. No matter what
lubricant you now use NON-FLUID OIL will
lubricate BETTER and MORE ECONOMI-
CALLY. Try it on your own car and note
the improvement.



"K No. 00 Special" grade for
sliding gear transmission.

"K. No. 000" for differential, com-
pression cups and all bearings.

Sold by leading dealers everywhere.
Look for the orange-colored can bearing
sprocket-wheel trade-mark shown above.

**New York & New Jersey
Lubricant Co.**

165 Broadway, New York
1430 Michigan Avenue, Chicago

SAGER—FORD

Backed by ten years of success in
the manufacture of shock absorbers.

INDISPENSABLE FOR COMFORT AND ECONOMY OF UPKEEP.

\$12.00 set of four.

SAGER FEATURES.

Drop forgings, heat treated.
Pressed steel shell, heavy gauge.
Dust proof.
Long helical springs, automatic in
action.

Sager has made springs 22 years—
10 years for Shock Absorbers.

Triple lock on dust proof
shell. Impossible to lose.

Bearing surface for pin
100% to 200% more than
others. No side motion.

Only five parts to each absorber.
Simplicity and lightness, yet greater strength and durability.

30 DAYS FREE TRIAL YEAR GUARANTEE

J. H. SAGER CO., 271 South Ave., Rochester, N. Y.

New England Distributor

F. SHIRLEY BOYD, 175 Massachusetts Ave., Boston, Mass.



Ford
Rear

AUTOMOBILE FIRE INSURANCE

Cut 15%.

Any car equipped with a



Pyrene
TRADE MARK
FIRE
EXTINGUISHER

Saves the owner 15% of the total cost of the premium of the policy. Your insurance company gives it.

Brass and Nickel-Plated Fire Extinguishers are the only one-quart fire extinguishers included in the list of approved fire appliances issued by the National Board of Fire Underwriters.

PYRENE COMPANY OF NEW ENGLAND
88 Broad Street Boston, Mass.

FOR WINTER LUBRICATION

Polarine

the standard oil for all motors.

Feeds freely down to zero.

STANDARD OIL CO., OF NEW YORK
Principal Stations

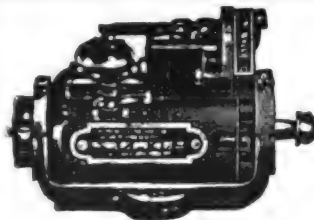
New York
Buffalo



Albany
Boston



(When Writing to Advertisers, Please Mention The Automobile Journal.)



Mea

Magneto

S. R. O. BALL BEARING

MARBURG BROS., Inc.,

Sole Importers
1790 Broadway, New York
Detroit Chicago



**NEW DOVER
TWO-IN-ONE**

Offset Funnel

New Cone Strainer
New Braced Spout

Removable Spout
Forming a Regular Funnel

Send for New 1914 Catalogue

DOVER STAMPING & MFG. CO.
CAMBRIDGE, MASS.



**GEISZLER NON-SULPHATING
STORAGE BATTERIES**

Guaranteed perfect satisfaction or money refunded

SIZE 66 - \$20.00

GEISZLER BROS. STORAGE BATTERY COMPANY
514 West 57th Street, New York City

F. SHIRLEY BOYD

175 Massachusetts Ave., Boston, Mass.

R. I. V. Ball Bearings.

Baldwin Chains and Sprockets.

J. H. Sager Line.

BRAENDER TIRES & TUBES



Are of the highest quality and the cheapest on mileage. They are built to last. Send for price list and particulars.

BRAENDER RUBBER & TIRE CO.
Main Offices and Factory, RUTHERFORD, N. J.

DIXON'S GRAPHITE CUP GREASE

For Motor Lubrication

Booklet No. 210

Mail in JERSEY CITY, N. J., by the
JOSEPH DIXON CRUCIBLE CO

(3)

Classified Buyers' Guide.

ACCESSORY MANUFACTURERS AND JOBBERS.

Alsten & Goulding Co., Worcester, Mass.
Auto Parts Co., Providence, R. I.
Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.
Times Square Auto Co., 56th St., at Broadway, New York City.

AIR COMPRESSORS AND TANKS.

Brunner Mfg. Co., Main Office and Factory, Utica, N. Y.; New York Office, Hudson Terminal Bldg., 30 Church St. (Brunner)
Williams Foundry & Machine Co., Akron, O.

ARBOR PRESSES.

Bartlett, Edwin E., 322 A St., Boston. (Greenerd.)

AUTOMOBILES. (See Cars.)

AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

Motor Specialties Co., Waltham, Mass.

BALLS AND BALL BEARINGS.

Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1790 Broadway, New York City; 805 Woodward Ave., Detroit.
Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (R. I. V.)
Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)
New Departure Mfg. Co., Bristol, Conn. (New Departure.)
Norma Co. of America, 1790 Broadway, New York City. (Norma.)

BATTERIES.

Geissler Bros. Storage Battery Co., 514 W. 57th St., New York.

BODIES—WOOD AND METAL.

Highland Body Mfg. Co., Cincinnati, O. (Highland.)
Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

BRAKE BANDING OR LINING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston, Mass. (Multibestos.)
Royal Equipment Co., 1378 Bostwick Ave., Bridgeport, Conn. (Raybestos.)
Russell Mfg. Co., Middletown, Conn. (Rusco.)
Standard Woven Fabric Co., Framingham, Mass. (Multibestos.)

Staybeston Mfg. Co., Lena and Armat Sts., Germantown, Philadelphia, Penn. (Staybestos.)

BRUSHES, WIRE.

Williams Foundry & Machine Co., Akron, O.

BUMPERS AND FENDERS.

Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Diamond.)

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARBURETORS.

Air-Friction Carburetor Co., Dayton, O. (Model C.)
Findelsen & Kropf Mfg. Co., 2127 Rockwell St., Chicago. (Rayfield.)

Zenith Carburetor Co., Detroit. (Zenith.)

CARS—GASOLINE PLEASURE.

Inter-State Motor Co., 804 West Willard St., Muncie, Ind. (Inter-State.)

Mets Co., Waltham, Mass. (Metz.)

Nordyke & Marmon Co., Indianapolis. (Marmon.)

Paige-Detroit Motor Car Co., Detroit. (Paige.)

Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Salvador Motor Co., Farragut Bldg., Massachusetts Ave., Boston. (Salvador.)

Scripps-Booth Co., Detroit. (Scripps-Booth.)

Studebaker Corp., Detroit, Mich. (Studebaker.)

Stutz Motor Car Co., Indianapolis. (Stutz.)

Velle Motor Vehicle Co., Moline, Ill. (Velle.)

White Co., Cleveland, O. (White.)

Willys-Overland Co., Toledo, O. (Overland.)

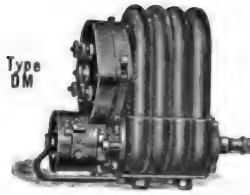
Winton Motor Car Co., 131 Berea Road, Cleveland, O. (Winton.)

CARS—GASOLINE COMMERCIAL.

Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)

Driggs-Seabury Ordnance Corp., Sharon, Penn. (Vulcan.)

When Writing to Advertisers, Please Mention The Automobile Journal.



HEINZE

Specify **HEINZE IGNITION APPARATUS** and reap the benefit of our years of experience and superior manufacturing facilities.

HEINZE ELECTRIC COMPANY

Sales Offices—Detroit, Michigan.

Factories—Lowell, Mass.

Service Stations—New York, Detroit, Chicago, Kansas City

Guaranteed for the Life of the Car

BETHLEHEM FIVE POINT SPARK PLUGS

Certain Ignition. No more Plug Troubles

A Type for Every Car. Booklet Free

THE SILVEX COMPANY, 171 Madison Avenue, New York

ANNULAR BEARINGS REGROUND

A complete stock of reground bearings of all sizes and makes on hand for immediate exchange. Also a complete stock of New Annular, Thrust and New Departure Double Row Bearings. Special bearings made on application.

1790 Broadway, New York, N. Y.

AHLBERG BEARING CO. CHICAGO. DETROIT. BOSTON.

AUTOMOBILE ELECTRIC LIGHTING SPECIALTIES

For the Automobile Owner and Manufacturer who wants SERVICE for his money

ELECTRIC LIGHTING SPECIALTIES Made to Order

CULVER-STEARN'S MFG. CO.

Worcester, Mass.

Detroit, Mich.

TRADE MARK
Raybestos
 REG. U.S. PAT. OFF.

"THE ORIGINAL AND BEST ASBESTOS BRAKE LINING"

THE ROYAL EQUIPMENT CO., BRIDGEPORT, CONN.

Write for full particulars



Why Freeze Yourself? Ruin Your Auto?

The Superior Safe Garage Heater

SAFE. NO FUMES.
 NO GASES

Equipped with pilot light. No matches, no danger, no discomfort. An ideal positive heater.

SUPERIOR MANUFACTURING CO.

N. S. Pittsburgh, Pa.



BRAKE LINING

The Ideal Brake Lining for All Types of Motor Vehicles. It Is Sold with the Fullest Guarantee for Quality, Service and Satisfaction.

Innumerable Tests Have Proven Its High Resistance to Wear and Its Efficiency for Braking. Heat-Resisting, Slow Wearing, Shock-Reducing and Safety Insuring, It Has No Equal.

Made in All Sizes to 9 Inches Width and 1/2-Inch Thickness.

Sold by Leading Dealers Everywhere, or Direct if Your Dealer Is Not Stocked. Dealers' Samples, Price List and Trade Discounts Allowed, Sent at Request. Special Attention Given Owner's Orders.

Russell Manufacturing Co.
Middletown, Conn.

The John V. Wilson Company, New England Selling Agent, 22 Motor Mart, Boston, Mass.

Peerless Quality in Smaller Size

"ALL PURPOSE" FOUR AND SIX
FOUR AT \$2,000 (Sixes \$250 Extra)
THE PEERLESS MOTOR CAR CO., CLEVELAND, OHIO

Makers also of the "48-Six" and Peerless Trucks.
Licensed under The Kardo Patents.

THE MOTOR TRUCK

A Recognized Authority in the
Commercial Vehicle Field

12 ISSUES

\$2.00 THE YEAR

\$485 Salvador Car \$485

Four-Cylinder, Water-Cooled Unit Power Plant with Three Speed Selective Transmission and Shaft Drive. The Quality and Equipment of the High-Priced Car at Cyclecar Price.

SALVADOR MOTOR CO., 126 Massachusetts Avenue
Boston, Mass.

MOTOR PARTS COMPANY

OFFICIAL

BOSCH DISTRIBUTOR

Zenith Carburetor Mohawk Tires Leak-Proof Rings

185-187 Columbus Avenue, BOSTON
818 No. Broad St., PHILADELPHIA SPRINGFIELD, MASS.

When Writing to Advertisers, Please Mention The Automobile Journal.

(BUYERS' GUIDE—Continued.)

Federal Motor Truck Co., Junction and Leavitt Sts., Detroit. (Federal.)
General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
Gramm-Bernstein Co., Lima, O. (B. A. Gramm's.)
Independent Motors Co., Port Huron, Mich. (Independent.)
Lauth-Juergens Motor Car Co., Fremont, O. (Lauth-Juergens.)
Palmer-Moore Co., Syracuse, N. Y. (Palmer-Moore.)
Peerless Motor Car Co., Cleveland, O. (Peerless.)
Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
Sanford Motor Truck Co., Syracuse, N. Y. (Sanford.)
Signal Motor Truck Co., Detroit. (Signal.)
Studebaker Corp., Detroit, Mich. (Studebaker.)
Sullivan Motor Car Co., Rochester, N. Y. (Sullivan.)
White Co., Cleveland, O. (White.)

CARS—ELECTRIC COMMERCIAL.

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

CEMENTS.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y. (Sta-Fix Radiator Mend.)
"X" Laboratories, Boston. (X Radiator.)

CHAIN LUBRICANTS.

Motor Accessories, Inc., 749 A Boylston St., Boston. (Chain-Lub.)

CHAINS, TIRE, AND ANTI-SKIDDING DEVICES.

Weed Chain Tire Grip Co., 28 Moore St., New York. (Weed.)

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

CIGAR LIGHTERS. (See Lighters.)

COILS.

Heinze Electric Co., Lowell, Mass.

CYLINDER CLEANING COMPOUND.

Bowling Green Sales Co., 42 Broadway, New York City.
Dyer Apparatus Co., Cambridge, Mass. (Oxy-Carbon.)

DRESSINGS, TOP AND LEATHER.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

ELECTRIC LIGHTING EQUIPMENT.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FIRE EXTINGUISHERS.

Pyrene Co. of N. E., 88 Broad St., Boston.

FORD AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

Russell Mfg. Co., Middletown, Conn.

FUNNELS, AUTO.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind. (Ross.)

GENERATORS.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

GUNS, GREASE. (See Pumps, Oil and Grease.)

HEADLIGHT DIMMERS.

Chaney Co., L. F., Springfield, O. (Chaney.)

HEATERS.

Superior Mfg. Co., N. S. Pittsburg, Penn. (Superior Safe Garage.)

HORNS.

Garford Mfg. Co., Elyria, O. (Tuto.)

JACKS.

Motor Specialties Co., Waltham, Mass. (Excel Auto.)

(BUYERS' GUIDE—Continued.)

LAMPS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric Trouble.)
Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Clamp.)

LIGHTERS, CIGAR.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)

LIGHTING SYSTEMS, ELECTRIC.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)
Garford Mfg. Co., Elyria, O. (Dynalux.)

LUBRICANTS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)
Continental Asbestos Corp., Worcester, Mass. (Spedolene.)
Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)
Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagle-line No-Karbon.)
Harris Oil Co., A. W., 326 So. Water St., Providence, R. I.; 143 No. Wabash Ave., Chicago. (Harris.)
New York Lubricating Oil Co., 116 Broad St., New York City. (Monogram.)
New York & New Jersey Lubricant Co., 165 Broadway, New York. (MotoRol, Non-Fluid, Kejex.)
Standard Oil Co., New York. (Polarine.)
Vacuum Oil Co., Rochester, N. Y. (Gargoyle Mobiloil.)
Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.
Eispemann Magneto Co., 32 33d St., Brooklyn, N. Y. (Eise-mann.)
Helnze Electric Co., Lowell, Mass. (Heco.)
Marburg Bros., 1790 Broadway, New York. (Mea.)
Splitdorf Electrical Co., 98 Warren St., Newark, N. J.

MAILING LIST.

Trade Circular Addressing Co., 166 W. Adams St., Chicago.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

MOTORS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Michigan.)

MOTOR STARTERS.

Automatic Appliance Co., 172 Columbus Ave., Boston. (Boston.)

PATCHES, TIRE.

Braender Rubber & Tire Co., Rutherford, N. J. (Cement-less.)

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

POLISH.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

PRESSES. (See Arbor Presses.)

PUMPS, TIRE.

Kellogg Mfg. Co., Rochester, N. Y. (Kellogg.)

RADIATOR CEMENT. (See Cements.)

REAMERS.

Harding Distributing Co., Boston. (Martell Aligning.)
RINGS. (See Piston Rings.)

ROAD BUILDING MATERIALS.

Barrett Manufacturing Co., New York. (Tarvia.)

ROLLER BEARINGS.

Hyatt Roller Bearing Co., Detroit. (Hyatt.)
Norma Co. of America, 1790 Broadway, New York City. (Norma.)

SEATS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Racing.)

SELF-STARTERS. (See Motor Starters.)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS.
Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Sager Peerless.)

Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Peerless.)

When Writing to Advertisers, Please Mention The Automobile Journal.



90% of motor ills are traceable to faulty lubrication. Often an inferior lubricant is directly responsible—a lubricant with an asphaltum base.

HARRIS OILS and GREASES, made of finest Pennsylvania Crude, have a paraffin base. Paraffin is a lubricant—asphaltum is not. Asphaltum means carbon deposit. There is not a trace of it in **HARRIS** products.

The wiser, more progressive dealers are handling **HARRIS OILS and GREASES**. Their customers who have tried these pure oils accept no others. Remember,

"A Little Goes A Long Way And Every Drop Counts"

Sold in bbls., half-bbls., 10 gal., 5 gal. and 1 gal. cans.

A. W. HARRIS OIL CO.

326 S. Water St. Providence, R. I.

Branch: 143 No. Wabash Ave., Chicago, Ill.



SPEDOLENE solves the problem of automobile and motor truck gear lubrication. One trial is all we ask. "A fair field and no favor" will demonstrate to your satisfaction that SPEDOLENE is the King of all lubricants for gears.

Henry H. Kroh, Boston Distributor.

MANUFACTURED BY
Continental Asbestos Corporation, Worcester, Mass.

REXO II \$3⁸⁵

The GARFORD MANUFACTURING COMPANY, 2506 Olive St., ELYRIA, O.

Successors to THE DEAN ELECTRIC COMPANY.



Patented
PISTON RINGS

McQUAY-NORRIS MFG. CO.,

In Use on Over
300,000

Automobiles

"ASK THE USER"

Dep't D, ST. LOUIS, MO.

There's no leak proof ring but the **LEAK-PROOF** Ring — insist

Subscribe for

The Motor Truck

647335

HEADQUARTERS FOR SOUTHERNERS IN NEW YORK

Broadway Central Hotel

COR. THIRD STREET

IN THE HEART OF NEW YORK

SPECIAL ATTENTION GIVEN
TO LADIES UNESCORTED**Special Rates for Summer**OUR TABLE is the foundation of
our enormous business.**American Plan \$2.50 upwards****European Plan \$1.00 upwards**

Send for Large Colored Map and Guide of New York, FREE.

TILLY HAYNES, Proprietor

DANIEL C. WEBB, Mgr.,

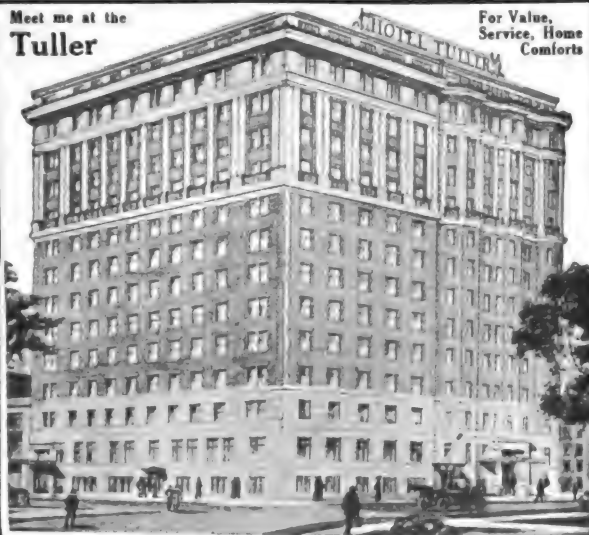
Formerly of Charleston, S. C.

The Only New York Hotel Featuring American Plan

Excellent Food.

Moderate Prices.

Good Service.

**New HOTEL TULLER**

Detroit, Michigan

Center of business on Grand Circus Park. Take Woodward car
get off at Adams Avenue.**ABSOLUTELY FIREPROOF**

200 Rooms, Private Bath, \$1.50	Single, \$2 50	Up, Double
200 " " " 2.00	" 3.00	" "
100 " " " 2.50	" 4.00	" "
100 " " " 3.00 to 5.00	" 4.50	" "

Total 600 Outside Rooms. All Absolutely Quiet.

Two Floors---Agents'
Sample RoomsNew Unique Cafes and
Caharet Exellente**(BUYERS' GUIDE—Continued.)****SPARK PLUGS AND IGNITERS.**

Alsten & Goulding Co., Worcester, Mass. (Alding.)
 Bosch Magneto Co., 223-225 W. 46th St., New York.
 Heinze Electric Co., Lowell, Mass. (Heco Priming.)
 Milwaukee Auto Specialty Co., 705-711 Chestnut St., Milwaukee, Wis. (Centerfire.)
 Splittdorf Electrical Co., 98 Warren St., Newark, N. J.

SPRINGS FOR AUTOMOBILE SUSPENSION.

Marburg Bros., Inc., 1790 Broadway, New York. (Marburg-Hagen.)
 Tuthill Spring Co., 776 Polk St., Chicago. (Titanic Unbreakable.)

SPROCKETS.

Hoyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

TEST CLIPS.

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Universal.)

THERMOS CASES.

Dover Stamping & Manufacturing Co., Cambridge, Mass.

TIMERS.

Motor Specialties Co., Waltham, Mass. (Bemus.)

TIRE ACCESSORIES.

Braender Rubber & Tire Co., Rutherford, N. J.
 Stevens Mfg. & Supply Co., Fisher Bldg., Chicago. (Stevens Valves.)

TIRE CHAIN GRIPS. (See Chains.)**TIRE PRESERVATIVES AND PROTECTORS.**

Braender Rubber & Tire Co., Rutherford, N. J.

TIRE REPAIR EQUIPMENT.

Stevens & Co., 373 Broadway, New York City. (Sampson Inner Tube Plug and Outfits.)

TIRES, CASINGS AND INNER TUBES.

Braender Rubber & Tire Co., Rutherford, N. J. (Braender.)

Federal Rubber Manufacturing Co., Milwaukee, Wis. (Federal.)

Goodyear Tire & Rubber Co., Madison St., Akron, O. (No-Rim-Cut.)

Lax-Fal Rubber Co., Dept. S, 77 Chambers St., New York City. (Lax-Fal Guaranteed.)

Miller Rubber Co., Akron, O. (Miller.)

Polack Tyre & Rubber Co., 246 W. 59th St., New York City. (Polack.)

TOPS AND ATTACHMENTS.

Highland Body Manufacturing Co., Station P, Cincinnati, O. (Highland Coupe.)

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

TRUCKS AND TRACTORS. (See Cars, Commercial.)**VALVE LIFTERS AND RESEATERS.**

Paro, H. G., Suite 718-719 Michigan Blvd. Bldg., 30 No. Michigan Blvd., Chicago.

VALVES, TIRE.

Stevens Mfg. & Supply Co., Fisher Bldg., Chicago. (Stevens.)

VARNISHES, ETC.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

VULCANIZERS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)

Vanderpool Co., Springfield, O.

Williams Foundry & Machine Co., Akron, O.

WELDING OUTFITS.

Dyer Apparatus Co., Cambridge, Mass. (Dyer.)

Waterhouse Welding Co., 3 Pelham St., Boston, Mass.

WHEELS, WIRE.

Houk Mfg. Co., 1709 Elmwood Ave., Buffalo, N. Y. (Houk Detachable.)

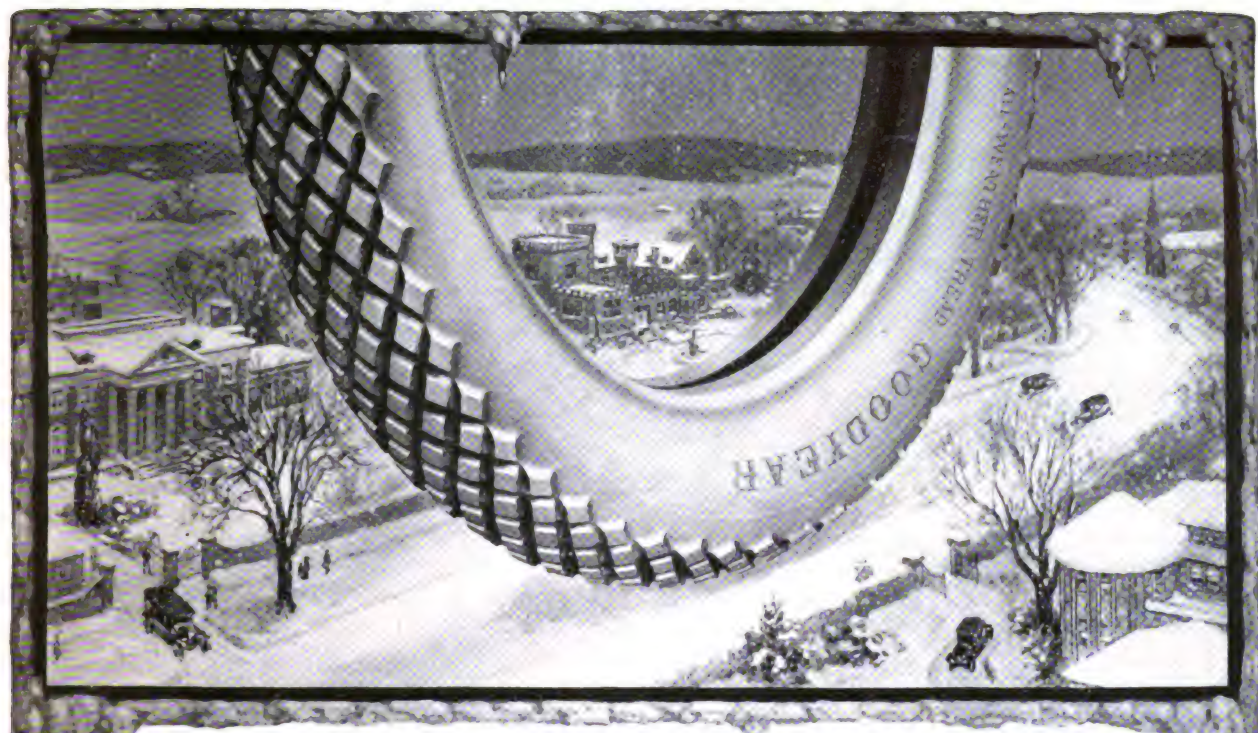
WRENCHES AND COMBINATION OUTFITS.

Coes Wrench Co., Worcester, Mass.

Laue, Will B., 180 No. Dearborn St., Chicago. (Unique Ratchet.)

Monsberg Co., Frank, Attleboro, Mass.

When Writing to Advertisers, Please Mention The Automobile Journal.



Maximum Protection In Five Ways Excelling Every Rival Tire

Do not these five protections cover what you most want in a tire?

If so, mark this: Goodyear Fortified Tires offer all of them. No other tire offers one of them, in our way or to our extent.

And these things, we claim, mark the quality tire, when combined with the best in rubber, fabric and making.

Men who know these tires agree with us. Goodyears have more users than any other tire that's built. Those users last year bought very close to a million and a half of these tires.

FIVE SUPREMACIES

Goodyear Fortified Tires stand alone and supreme in these five respects:

No other tire combats rim-cutting as they do.

No other tire gets the "On-Air" cure—a process which costs us \$450,000 yearly—a process which saves the countless blow-outs due to wrinkled fabric.

No other tire combats loose treads as we do. We've reduced this risk 60 per cent.

No other tire is held so firmly to the rim. In each tire base we vulcanize six flat bands of 126 braided wires.

No other tire has our All-Weather tread. It is tough and double-thick, so puncture is difficult. It has sharp, resistless grips. And those grips—flat,

broad and deep—are immensely enduring.

20 BILLION MILES

Goodyear tires have traveled close to 20 billion miles. Hundreds of thousands have used them. The place they hold after all that experience shows what these protections mean.

They mean the best average service. They are subject to misuse and mishap like any other tire. But they best avoid these major troubles because they are built to avoid them.

Yet these extra features involve no extra price. Our mammoth output saves us what those extras cost.

You owe yourself a trial of such tires—the tires that won top place. Any dealer will supply you.



THE GOODYEAR TIRE & RUBBER COMPANY, AKRON, OHIO

(2179)

BOSTON AUTO SHOW

MECHANICS BUILDING

MARCH 6 to 13

OPEN SATURDAY EVENING, 7 O'CLOCK

EVERY DAY, 10 A.M. to 10.30 P.M.

**OVER 400 EXHIBITORS
OF
Pleasure Cars—Motor Trucks
Accessories.**

ADMISSION 50c	SOCIETY DAY WEDNESDAY, MARCH 10	\$1.00
----------------------	--------------------------------------------	---------------

Personal Direction—Chester I. Campbell

VOL. XXXIX.

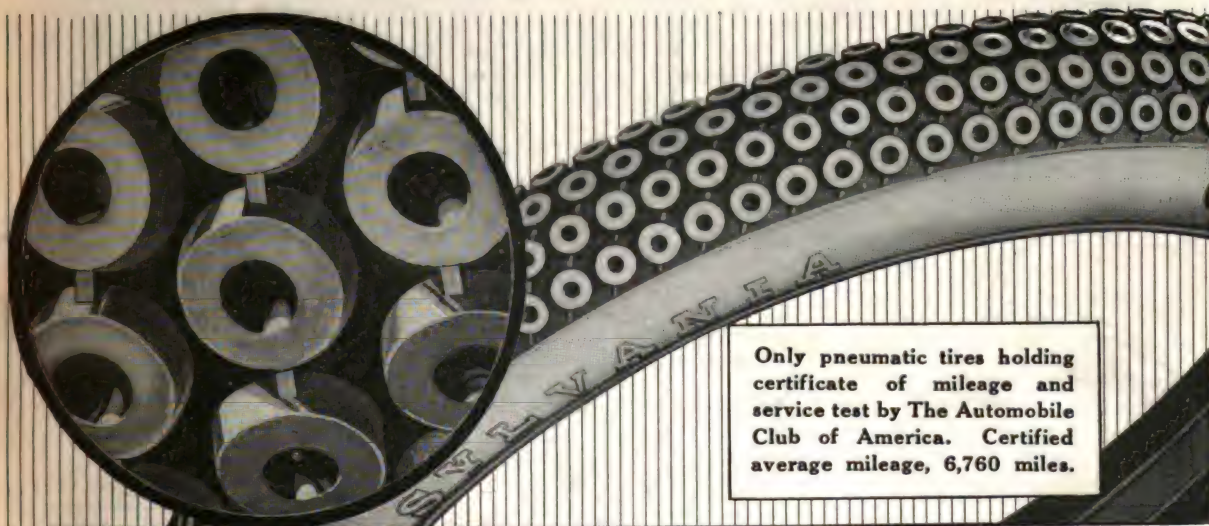
NO. 2.

AUTOMOBILE *JOURNAL*

\$1.50 the year
10 cents the copy

PAWTUCKET R.I.

February 25, 1915



Only pneumatic tires holding
certificate of mileage and
service test by The Automobile
Club of America. Certified
average mileage, 6,760 miles.

REDUCED PRICES

open a still broader market
for the distribution of

PENNSYLVANIA *Oilproof* VACUUM CUP TIRES

The completion of the most modern tire plant in the country, with a capacity **three times** the 1914 production, is an assurance that every cent of cost goes toward the maintenance of **quality**, rather than for costly out-of-date methods of manufacture.

We give users of Pennsylvania Tires the full benefit of reduced costs, with the assurance that the quality of the 1915 product is **even better** than the 1914 tires on which The Automobile Club of America certified an average of **6,760 miles** on cars weighing over 4,000 pounds.

Our aggressive advertising campaign, employing magazines, newspapers and bill-boards throughout the country will bring Vacuum Cup Tires into greater prominence than ever before.

Dealers who make early arrangements to meet the resultant demand will be the biggest winners.

PENNSYLVANIA RUBBER CO.,

JEANNETTE, PA.

Atlanta
Boston
Chicago

Cleveland
Dallas
Detroit

Kansas City, Mo.
Minneapolis
New York

Omaha
Philadelphia
Pittsburgh

St. Paul
San Francisco
Seattle

An Independent Company with an Independent Selling Policy



Price and Quality Must Balance

The quality of the brake lining you sell must be consistent with the price you charge for it, or you will not be able to hold your trade.

This is so—and nobody knows it better than you. That Price and Quality must balance is just as true with respect to net prices as it is with list prices.

What is the Quality of brake linings which list the same as RAYBESTOS, and in some cases higher, but are offered you at a lower net price?

What do you suppose is the lowest net price?

How do you know when you get it?

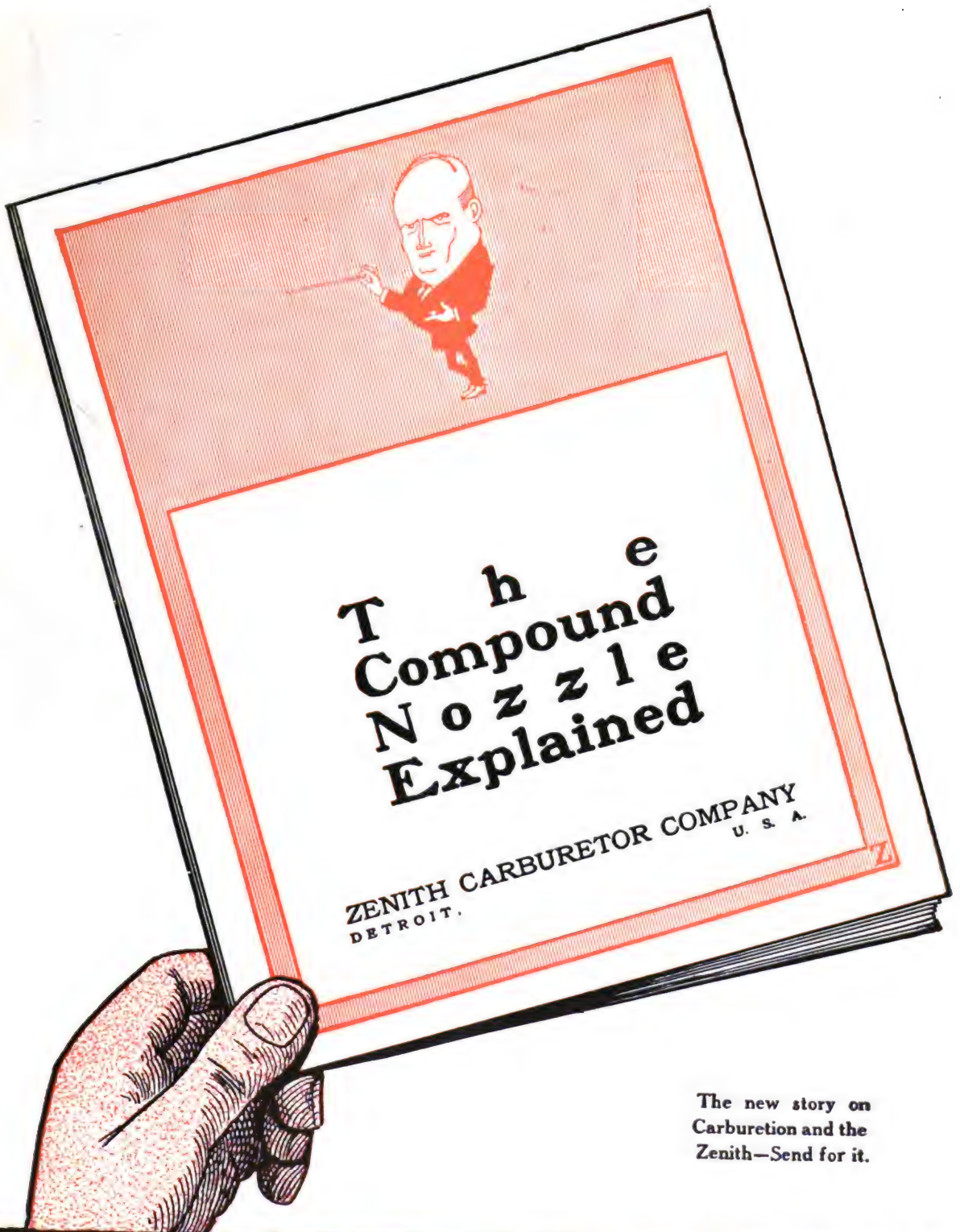
How long before juggled discount prices will affect you?

RAYBESTOS prices—both net and list—are fixed, the same to all—and at all times consistent with RAYBESTOS Quality.

The Royal Equipment Company

1378 Bostwick Avenue

Bridgeport, Conn.



The new story on
Carburetion and the
Zenith—Send for it.

BOSTON AUTO SHOW

MECHANICS BUILDING

OPENS SATURDAY

2 P. M.

ALL NEXT WEEK

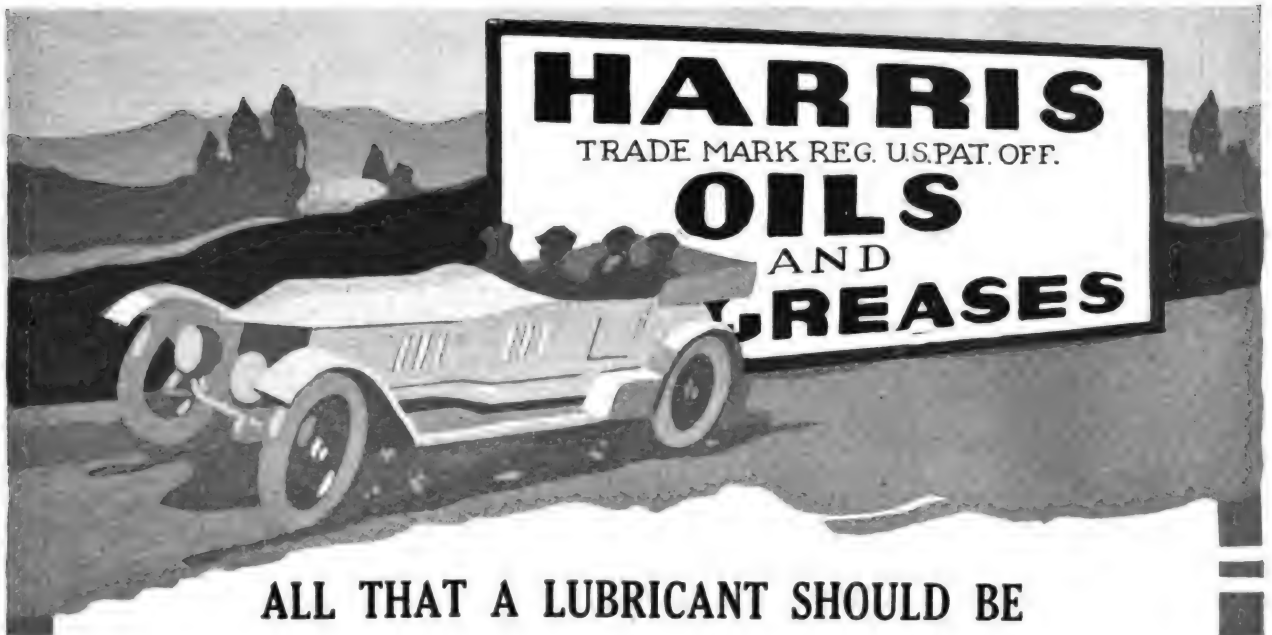
10 A. M. to 10.30 P. M.

**OVER 400 EXHIBITORS
OF
Pleasure Cars—Motor Trucks
Accessories.**

ADMISSION 50c	SOCIETY DAY WEDNESDAY, MARCH 10	\$1.00
----------------------	--------------------------------------------	---------------

Personal Direction—Chester I. Campbell

When Writing to Advertisers, Please Mention The Automobile Journal.



ALL THAT A LUBRICANT SHOULD BE

A motor lubricant must have something more than mere "slipperiness". Simply a greasy fluid is not sufficient to keep a motor running right. The lubricant's body must possess the stamina to withstand high motor temperatures. It must stand a high viscosity test. That film of oil between piston and cylinder wall must *stay* a film and not break down and lose its consistency. It must cling to the bearing surfaces and conquer machinery's enemy—friction

HARRIS OILS AND GREASES are all that is to be desired—and more, too. From the Tiona district of Pennsylvania, the best of Crude oils with a *paraffin* base—not a trace of asphalt—are obtained to be refined into HARRIS products. Paraffin means *lubrication* and the absence of asphalt means absence of carbon deposit in cylinders. We start out right. The refining process is one which we have developed and perfected during our 30 years' experience in this industry.

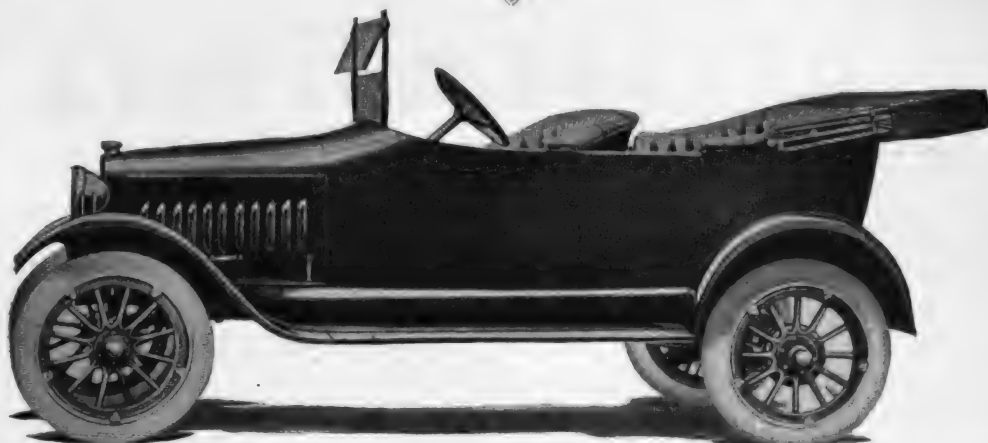
For the man who drives a \$400 runabout; for the owner of an \$8000 limousine, we make lubricants that give better results than ordinary oils. Recommend HARRIS OILS and some weeks hence your customers will thank you and demand more. HARRIS users are appreciative.

Our oils sold in Bbls., Half Bbls., 10 Gal., 5 Gal. and 1 Gal. Cans.

"A Little Goes a Long Way and Every Drop Counts"

A. W. HARRIS OIL CO.,

326 S. Water St., PROVIDENCE, R. I. Branch 143 No. Wabash Ave., CHICAGO, ILL.



SAXON "SIX" \$785

Now a "Six" at a Low Price

Among many distinctive features of the new Saxon "Six", the most impressive are these:

It is the **first** "Six" produced at a price as low as \$785.

—the **first** "Six" at less than \$1250 with 30-35 H. P. long stroke, high-speed motor.

—the **first** "Six" at less than \$1250 with 112-inch wheelbase.

—the **first** "Six" with a lower cost of operation than most "fours".

—the **first** standard "Six" of truly light weight.

—the **first** "Six" at or near its price with 32x3½" tires and demountable rims.

—the **first** "Six" within double its price to offer so many high class features as standard features.

—the **first** low-priced "Six" which from radiator to tail light represents in every feature an absolutely **modern** design.

—the **first** "Six" that so ideally combines simplicity and lightness with strength and sturdiness.

—the **first** "Six" at less than \$1250 that so faithfully carries out the genuine streamline body effect.

If you have considered the possession of a "Six" a privilege to be enjoyed only by a small number—

If you have thought a reliable-acting "Six" must be priced at \$1250 or more—

If you have supposed that a "Six" is necessarily heavy and therefore costly to keep—

Then the new Saxon "Six" will give you a new idea of motor car values.

Saxon Motor Company, Detroit
Be Sure to See the New Saxon
"Six" at the Boston Show



A Big, Roomy, 5-Passenger Car ---The Saxon "Six"

For those who want a touring car this new 5-passenger, six-cylinder Saxon is truly an unusual value.

It is generously roomy; it is in no sense a small car; it is not to be compared with small cars. In size and specifications it compares with cars selling around \$1250.

Nor is the new six-cylinder Saxon "just another automobile". It is a Saxon—stylish, distinctive, different.

Unlooked-For Features

Saxon six-cylinder motor is of the L-head type, with cylinders cast en bloc, and develops 35 horse power on block test. Oiling system is of the splash type, with pump circulation.

Frame is $4\frac{1}{2}" \times 1\frac{1}{2}" \times \frac{1}{8}"$ of the best grade 25-point carbon steel, deep channel section.

Front axle is an I-beam forging; the rear axle is three-quarter floating type with full Hyatt bearing equipment throughout.

Transmission is three speeds forward and reverse, on the rear axle.

Springs are of the modern Saxon cantilever type, found elsewhere only on much higher priced cars. They are of vanadium steel and provide unusual riding steadiness and comfort.

Saxon clutch is dry plate, the same design found on many high priced cars, and constructed of the very best materials.

This new Saxon is full five-passenger capacity; only one other car selling under \$1250 has equal inside width of the tonneau seat, and none has more. The body is full streamline, very graceful and pleasing to the eye.

Makers of high priced cars were first to be converted to belief in the six-cylinder principle. Then came the makers of medium priced cars. To-day both are building "Sixes" exclusively. And now comes the Saxon to prove that the day of the "six" at a low price is here.

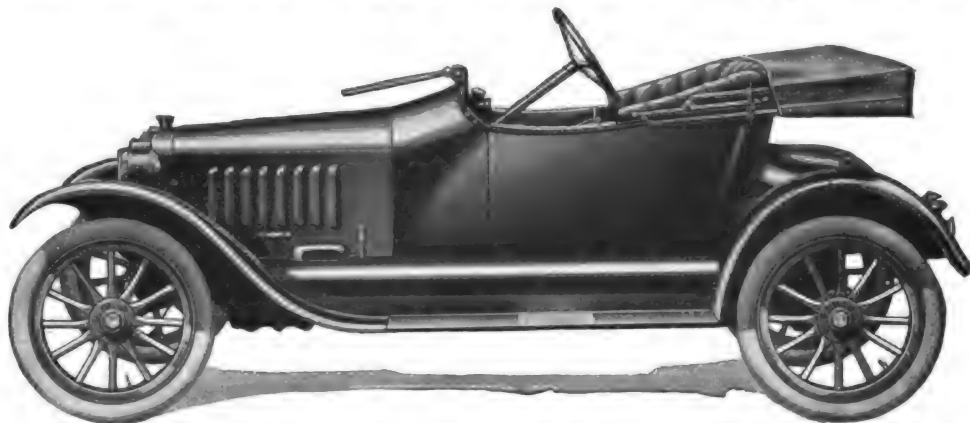
See it at the Boston Automobile Show and be convinced.

Saxon Motor Company, Detroit, Dept. A.J.
The Saxon "Six" is the Newest Car
At the Boston Show---Don't Miss It.

See Next Page



SAXON ROADSTER \$395



The Car That Makes Both Ends Meet

\$395

What
it Costs to
OWN

One

The two-passenger Saxon has removed the last objection any one ever had to owning an automobile—the price reason.

For the first cost of the Saxon *places* this sturdy car within reach of every one. Its price is \$395.

And the after-cost of the Saxon *keeps* it within the means of everyone. Saxon roadsters average half a cent a mile in operation cost—one-fourth of a cent per mile per passenger.

And the Saxon stands up. It endures the hardest kind of usage without finching. Many thousands of Saxons now in use all over the United States, in Canada, and in foreign countries have proved the sterling goodness of Saxon construction.

How We Can Do It.

Some folks wonder how we can possibly build for \$395 a car that will do the things a Saxon will do. Good design is the answer—knowing how—having the right idea of what a light car should be and do, and then figuring out the best way to get these results at

the lowest cost consistent with quality.

For instance, Saxon engineers used, perhaps for the first time in this country, a high-speed motor. A few years ago it would have been impossible to build a motor the size of the Saxon and have it deliver adequate power. Today we know how to do it. Saxon engineers have designed a motor that is at once light, powerful, efficient and very durable.

Saving 45 Parts at a Stroke

Saxon engineers found a method of spring suspension that makes a light car exceedingly comfortable to ride in and at the same time saves 45 parts. Think of it—45 parts saved by one idea of design.

And still more wonderful—the Saxon type vanadium springs provide the fullest riding comfort. No less than 15 higher priced cars have already adopted this type of springs.

In the Saxon Roadster our engineers use one large steel stamping as motor base, subframe, sod pan and dust apron, saving another two score parts, providing a better construction and reducing expense. Right design again.

And so on all through the car. By taking thought, we are able to offer for \$395 a better automobile than could be bought only a few years ago for five times the price. Saxon is the modern car.

For 1915 the Saxon roadster offers a number of new refinements that make it even more stylish and snappy than before—beautiful body of genuine streamline effect identical in style with high-priced two-passenger cars; wood or wire wheels; standard or 60-inch tread. Electric lights and starter \$70.

1-2¢

per mile
What
it Costs to
RUN

One

Saxon Motor Company, Detroit

The Saxon Line Is a Desirable Line to Handle. Learn Why at Boston Show.

See preceding page



SAXON Delivery Car \$395

The Saxon Delivery Car already is making good in many lines of business, proving itself without a rival in economy, and demonstrating its efficiency in delivering the goods.

For \$395, the price of a good horse and wagon, the Saxon now brings motor delivery within reach of thousands and thousands of merchants. Its low price, its low upkeep and its dependability all combined, make it the ideal vehicle for quick delivery of goods.

400 pounds (besides driver's weight) are accommodated in the Saxon Delivery Car. It has the well proved four-cylinder Saxon motor, sliding gear transmission, dry plate clutch, shaft drive, standard tread and other standard features.

Storm curtains for use in inclement weather and

low loading platform, making it easy to handle goods, are further advantages of the Saxon that will be appreciated by every driver. The Saxon turns short; it takes up little room. It is simple to operate, and is well built of high grade materials.



Saxon Delivery Car, 400 pounds capacity, besides driver's weight, \$395

Why This Will Be a Big Saxon Year

The Saxon Delivery Car has a big market, because it fills a widespread demand. Write for literature.

The record of the new Saxon 5-passenger "Six", and the Saxon 2-passenger roadster at this year's automobile shows has been very gratifying to us.

From every angle—by every method of judging—the Saxon "Six" and the Saxon Roadster have scored a pronounced success. They have passed muster before a critical buying public; before leading dealers everywhere; be-

fore engineering and sales experts widely known in the automobile business.

This record can only mean one thing; that this is going to be a big Saxon year. Every indication points that way. Our monthly shipments right now are running away ahead of last year's average. Saxon cars offer big value at popular prices. For that reason they appeal alike to the buying public and to dealers. Write and get our offer to dealers in territory now open.

Saxon Motor Company, Detroit, Dept. AJ.

Saxon Cars Offer Better Values at Popular Prices Than Any Other Cars

The Oil that Suits and Does not Soot

Space
541
Balcony
Boston
Show

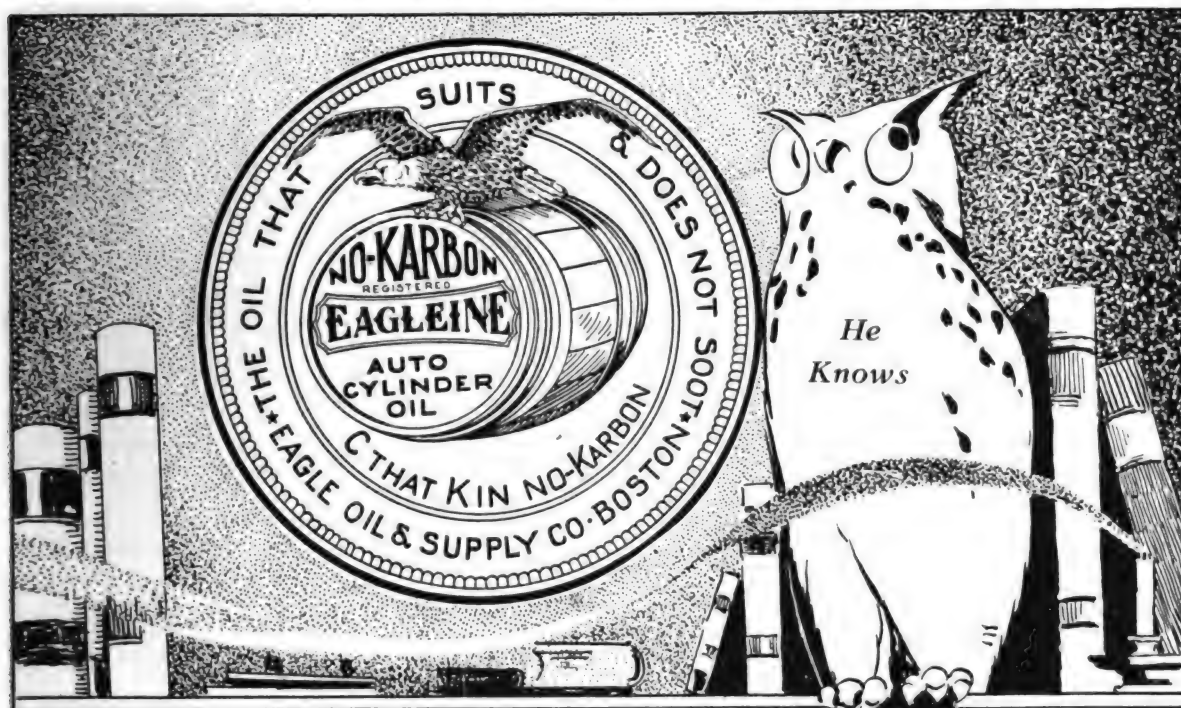
EAGLE

WHEN you measure quality you use the best standard known to you. This standard may be service, economy, efficiency, expense of maintenance, endurance, mileage, speed, power, comfort or pleasure, or possibly several of these factors. But judgment is based on experience.

EAGLEINE No-Karbon Oil quality is measured by users by the degree of engine efficiency and economy of consumption, factors that have been proven by constant use for more than twelve years by motorists who know from experience what constitutes good lubrication and what results from using inferior grades of oil.

Only experience will demonstrate quality,—the real value as shown by service,—and quality is the real standard by which to judge.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



E I N E

Space
541
Balcony
Boston
Show

EAGLEINE No-Karbon Oil represents highest quality. This quality is guaranteed to every consumer. There is no "just as good," for it cannot be equalled for water-cooled gasoline engine lubrication.

Discriminating motorists realize that there is the largest measure of economy in quality as well as the extreme satisfaction of highest efficiency and the fullest realization of motoring pleasure.

EAGLEINE has never been an experiment. The name indicates quality,—the Quality that demands your trade, and is known to thousands of motorists.

EAGLEINE is sold Everywhere by Quality Dealers. Ask for it.

EAGLE OIL AND SUPPLY COMPANY
104 Broad Street BOSTON, MASS.

NOW Is The Opportune Time TO STOCK "RELIABLE" TIRES

CONSUMERS' PRICE LIST

Size	Plain Tread	Non-Skid Tread	Red Inner Tubes
28 x 3	8.11	8.92	2.50
30 x 3	8.60	9.40	2.60
32 x 3	9.09	10.00	2.80
29 x 3½	10.91	12.00	2.95
30 x 3½ *	11.23	12.35	3.00
31 x 3½	11.56	12.72	3.05
32 x 3½ *	11.89	13.08	3.10
34 x 3½ *	12.53	13.78	3.30
30 x 4	13.75	15.13	4.00
31 x 4	14.27	15.70	4.10
32 x 4 *	14.79	16.27	4.20
33 x 4 *	15.30	16.83	4.35
34 x 4 *	15.83	17.41	4.45
35 x 4 *	16.35	17.99	4.55
36 x 4 *	16.57	18.23	4.65
34 x 4½	21.45	23.60	5.55
35 x 4½ *	22.10	24.30	5.65
36 x 4½ *	22.75	25.02	5.80
37 x 4½ *	23.40	25.74	5.90
35 x 5	25.70	28.27	6.75
36 x 5 *	26.50	29.15	6.90
37 x 5 *	27.25	29.97	7.00

Sizes marked (*) can be furnished in straight side.

ACT NOW

while all the newspaper agitation over inflated prices is confusing the public.

MEET US AT THE AUTO SHOW IMPORTANT

Owing to the fact that "Reliable tires" are sold at minimum prices, CASH must accompany order.

ELLIS-WARD CO.

817 BOYLSTON ST. BOSTON, MASS.
NEW ENGLAND DISTRIBUTORS

It is the time to demonstrate to your trade that there is at least **one** brand of tires from which it can secure a square deal in quality and price.

DEMAND has proven that the prices of "Reliable" Tires have been **RIGHT** from the start. Consequently we have not been burdened with overstock nor obliged to thrust "left overs" on the market with a view to getting rid of them at **any old price**.

READ THIS GUARANTEE

then cast your eye over the price list—they both speak for themselves.

OUR GUARANTEE

We guarantee "RELIABLE" TIRES against manufacturers defects. Any tires returned to us showing defect in manufacture will be adjusted on a basis of 3500 miles.



When Writing to Advertisers, Please Mention The Automobile Journal.

Inter-State

Why \$1000?

Less—Means an Inefficient Product

The three cardinal qualities of an efficient automobile are Power, Comfort and Beauty.

Experience and investigation have shown the Inter-State Motor Company that *below* one thousand dollars, one or the other of these three qualities must be sacrificed to meet the price.

More—Means an Extravagant Buy

There are cars *above* one thousand dollars which offer Power, Comfort and Beauty.

But, to justify the price, the manufacturer must add to his product expensive details of finish and equipment which are unnecessary to the buyer.

The Boston Show offers every prospective New England Buyer and Dealer the best opportunity to learn the exceptional value of the Inter-State. The car proves the price is right.

A Ride Will Convince You!

Charles Motor Co.

Boston, Mass.

Distributors

"There is only one other thousand dollar car as good as an Inter-State."

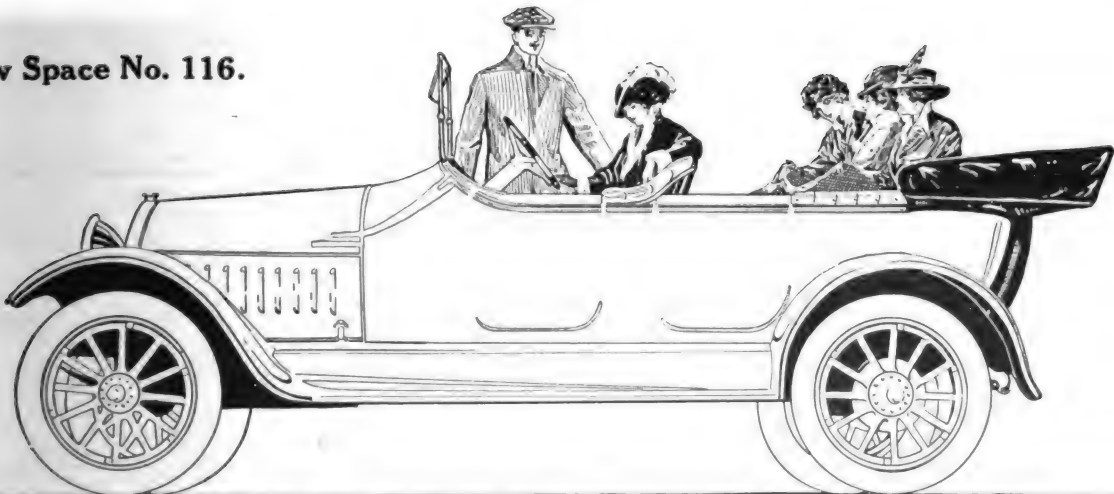
INTER-STATE MOTOR CO.

MUNCIE

Makers

INDIANA

Show Space No. 116.



When Writing to Advertisers, Please Mention The Automobile Journal.

SPEDOLENE



The Wonder Lubricant

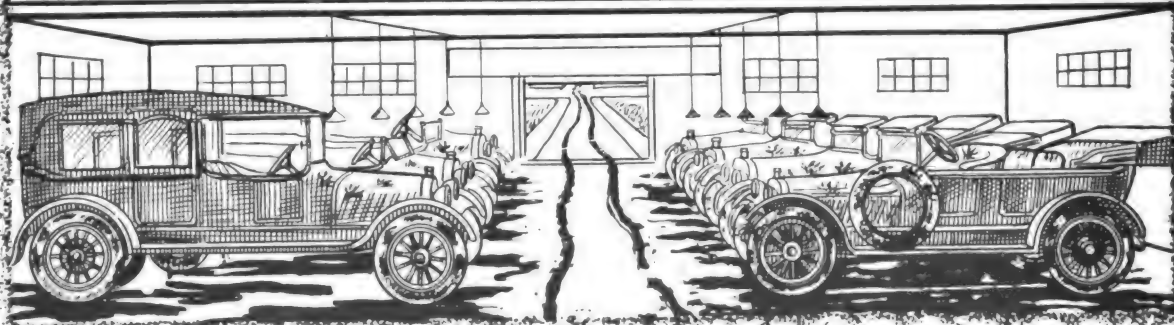
SPEDOLENE ECONOMY is represented by double the mileage that can be obtained from a given volume of any other oil or grease, by complete lubrication of all wearing parts, and by insurance against waste from leakage—a waste that is destructive of expensive tires and costly finish of the cars.

SPEDOLENE EFFICIENCY is represented by a saving in fuel. It is a compound of highest grade mineral oil and asbestos, that is known to science as the greatest lubricant ever discovered. It is heat resisting, it cannot be changed chemically, it does not affect metals, does not flow or drip, and will absolutely prevent noise.



DOUBLE YOUR CAR MILEAGE BY DEMANDING SPEDOLENE

SPEDOLENE LUBRICITY is represented by a constant quality of lubrication. It will penetrate between the contacting surfaces of all bearings, it will carry the loads and prevent wear of bearings, and it will not solidify or gum. It is for all parts of the motor vehicle except the engine.



When Writing to Advertisers, Please Mention The Automobile Journal.



SPEDOLENE

No Leakage Waste

There is absolutely no leakage of the oil, on the road or in the garage, and there is a saving of more than 50 per cent. in lubricating value because all the lubricant is used.

The cohesion of the refined mineral oil to the asbestos is a peculiar quality of this compound. The lubricant is retained in the casing, housing or bearing, and lubrication is constant and uniform, the wear being taken by the asbestos and the oil affording the fullest degree of lubricity.

SPEDOLENE is good to the last ounce. It has been proven in extremely heavy duty by some of the largest railroads, and is sold with an absolute guarantee of highest efficiency. It can be used for gearsets, differentials, universal joints and all bearings in frictional contact.

SPEDOLENE is made in two grades—Grade S for new and average used machines, and Grade SS for worn and noisy gears. It is packed in 5, 10, 25 and 50-pound cans, half barrels and barrels, and is delivered under seal direct or by dealers.

The SPEDOLENE selling proposition will be fully explained at the request of any dealer.

Continental Asbestos Corporation

7-11 Summer Street, Worcester, Mass.

Exhibiting at the Boston Show, Space 551.



When Writing to Advertisers, Please Mention The Automobile Journal.



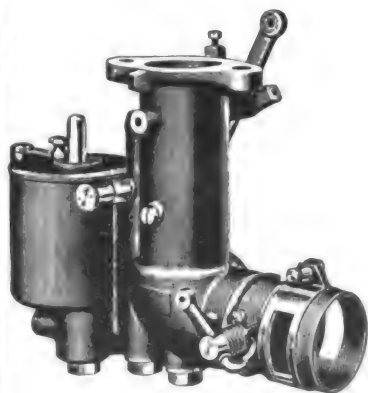
MOTOR PARTS

Protects Motor Lighting - Star

Electrical and Special Equipment



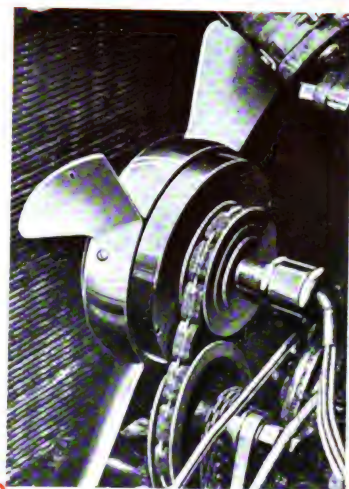
Bosch Ignition for any car, boat or stationary engine. Special attachments and Bosch ignition for battery equipped cars. Special Bosch Ford Attachment. Bosch Spark Plugs and spare parts. Bosch Rushmore Starting and Lighting systems. Rushmore and Solar Lamps, cable, connections, batteries, etc. Zenith Carburetors. Kemco Fan Type Generators and Universal Starting and Lighting systems for cars in service. Kemco Ford Lighting and two-unit Starting and Lighting systems. Leak-Proof Piston Rings.



Motor Parts Company

Boston 187 Columbus Ave
Springfield 143 Chestnut St.

TS SERVICE ists at all Times ting - Ignition



for Motor Cars and Motor Boats

We invite every supply store and garage in New England to convert our organization and facilities to their special benefit in serving motorists.

We are in a position to give expert advice with reference to ignition, lighting, starting and carburetion.

We install into cars and boats magnetos, lighting and starting systems.

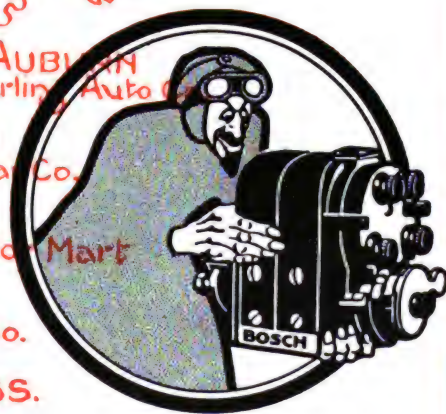
We repair and reconstruct ignition systems and generators.

We gladly submit estimates, give quotations and send special literature on request.

Official Distributors

Philadelphia
818 No. Broad St.

Buffalo
1064 Main St.



The Wastefulness of "Price" Buying

To save money in purchasing is a duty every one owes to his business. "Price" buying, however, does not always mean economy.

A few dollars "saved" in buying a typewriter may turn out to be many dollars wasted and make an expense of what should have been an investment.

The higher price paid for the

L. C. Smith & Bros. Typewriter

is paid for the greater amount of superior work it will turn out and its greater durability.

You will be surprised to learn what a great difference there is in typewriters. The cheapest is usually the most expensive.

Send for Free Book or Ask for a Demonstration

L. C. Smith & Bros. Typewriter Company

Home Office and Factory, SYRACUSE, N. Y.

Branches in All Principal Cities



When Writing to Advertisers, Please Mention The Automobile Journal.



Business Better Than Ever

In spite of the general reports, about depressed business throughout the country during the past season, the Overland business has never shown such a steady and healthy increase.

In the twelve months ending December 31st, 1914, we delivered

48,468 cars

During the same period in 1913 we delivered

37,129 cars

Certainly this must clearly indicate which is the best car in the minds of the public.

Catalogue on request. Please address Dept. 52.

The Willys-Overland Company, Toledo, Ohio

Tools

Oils

Greases

1 CARAT

Rain Coats

Chains

Reliners

Lamps

Horns

Carburetors

Windshields

Presto Tanks

Jacks

Tire Holders

Leakproof Pistons

Electric Lamps

Metal Tool Boxes

Fire Chains

Speedometers

Fur Coats

Auto Trunks

Garage Equipment

Tires

Robes

Gloves

Goggles

Vulcanizers

Pumps

Shock Absorbers

Brake Lining

Alsten & Goulding
**LARGEST EXCLUSIVE AUTO-
 MOBILE ACCESSORY DEALER
 IN CENTRAL NEW ENGLAND**

A stock that includes every desirable article of equipment or supply used with motor vehicles, or in service stations, garages, or repair shops.

OUR 1915 CATALOGUE
 has the same value to motorists that the newspaper has to the general public. It places them in direct touch with the best productions of the industries.

A TRADE ENCYCLOPEDIA
 that describes, illustrates and prices hundreds of articles, from machine tools to the highly specialized equipment, everything that can be sold with our fullest guarantee.

A COPY AT REQUEST
Tire Repair Specialists: We have a tire repairing department that does exceptional work. Our customers are all over New England. A trial and our charges will establish the value of this service.

36 Foster St., Worcester, Mass.

When Writing to Advertisers, Please Mention The Automobile Journal.



TEXACO MOTOR OIL

A Recommendation By Louis Disbrow

THIS famous racing driver, who knows motor cars from A to Z, wrote us a long letter telling of his experiences with Texaco Motor Oil. Frankly, knowing that he had used Texaco we wrote Mr. Disbrow and asked his opinion of it. The entire letter is too long to quote here, but it says in part:

“*** I find in using Texaco, the temperature of the motor is reduced 20° F. *** I have never found it necessary to take up a bearing or to remove carbon or grind valves during the entire season. When I was using the other two lubricants in two months of racing, it was necessary for me to remove carbon twice, grind my valves twice, and take up the bearings once. *** I am proud to say that Texaco products assisted most materially. *** I wish to congratulate you most heartily on the service that your oil has given.***”

What stronger recommendations could an oil receive? Mr. Disbrow is an expert in his profession. His word carries weight. When you buy Texaco Motor Oil you get exactly the same quality that Mr. Disbrow uses. Try it and judge for yourself whether or not his praise is merited.

If you will drop us a line on a postal card we will gladly send you the full text of the letter from which we have quoted. Address: Advertising Department.

THE TEXAS COMPANY
17 BATTERY PLACE NEW YORK CITY

When Writing to Advertisers, Please Mention The Automobile Journal.

DOVER



STAMPED METAL SPECIALTIES

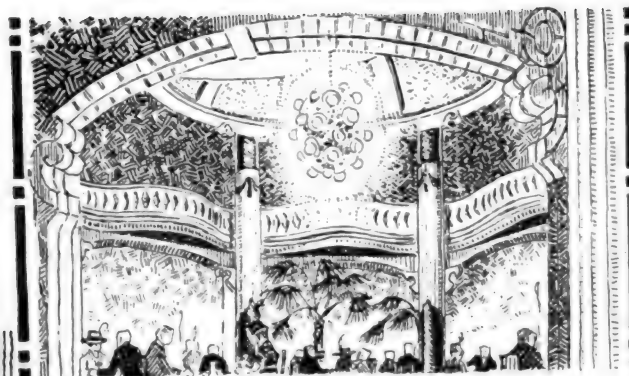
Perfect economy of handling lubricants and fuel can be secured by the use of the measuring and flow-controlled Dover funnels, measures and containers. Made of highest quality metal, perfect in workmanship, they are the standards of the motor world and are suited for use in the public or private garage.

The Dover specialties include motorcycle and motor boat funnels, combination measures and funnels, tourist oil and gasoline kits, auto safety drip pans, safety gasoline cans, safety waste cans, gas tank covers, tire testing tanks, gasoline measures, radiator fillers, gasoline cans, oilers, and service station and shop equipment.

*Catalogue illustrating, describing, and giving prices by sizes of
Dover specialties sent at request.*

DOVER STAMPING AND MANUFACTURING COMPANY
Cambridge, Mass.

When Writing to Advertisers, Please Mention The Automobile Journal.



HOTEL LENOX

Boston Headquarters of New England's
Motorists and Tourists

In the center of the Back Bay District, equally accessible from the New Haven and Boston & Albany stations, the subway, the trolley lines and by road when entering Boston from any direction.

One block from the Mechanics' Building, the location of the Boston Automobile and Truck Show.

Service and Cuisine are unsurpassed. The Lenox has every appointment to afford comfort and convenience and satisfy the most discriminating traveller.

Under the management of L. C. Prior the Lenox has been brought to a standard that is the highest of any hotel in New England.

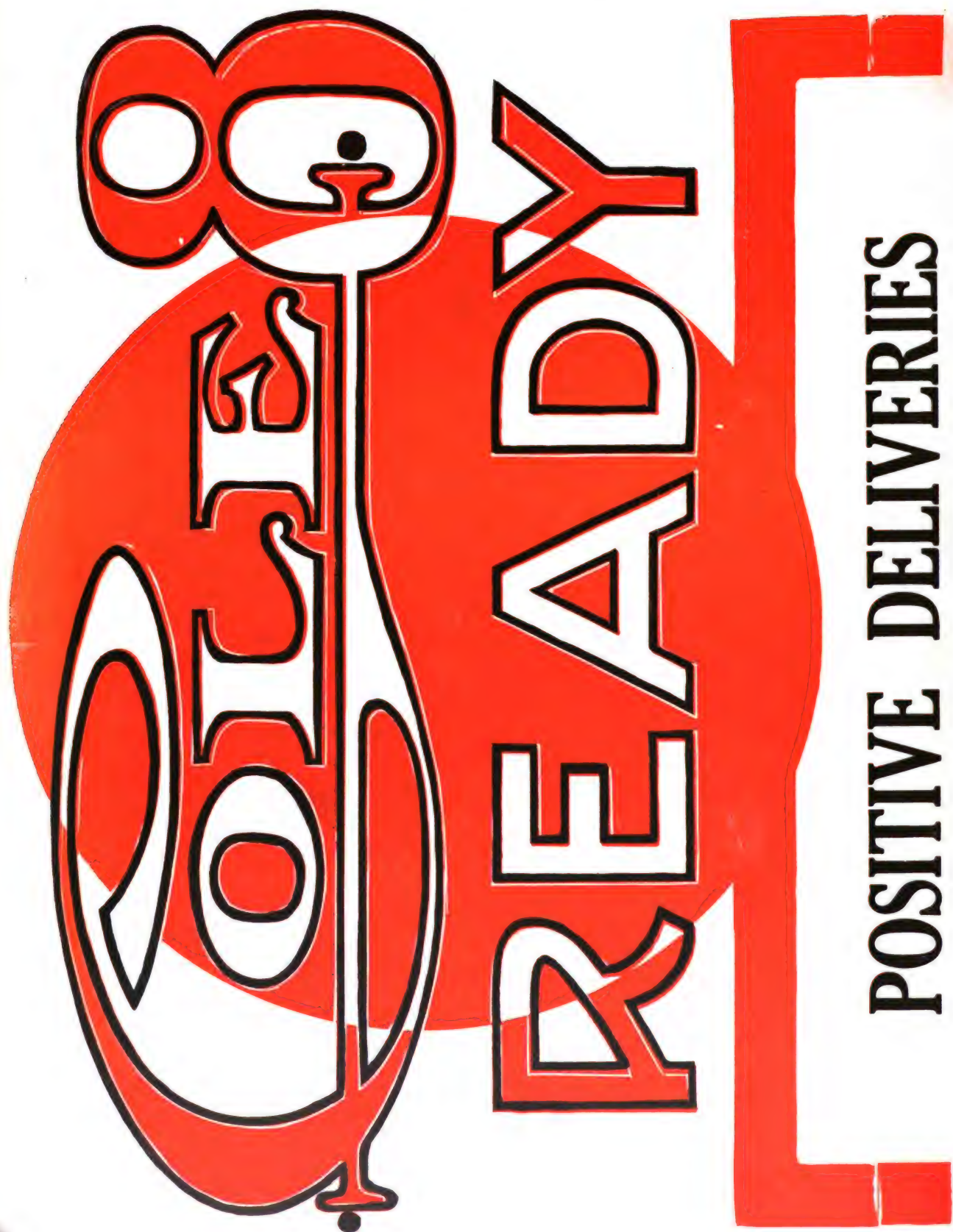
HOTEL LENOX

Boylston and Exeter Streets

Boston, Mass.



When Writing to Advertisers, Please Mention The Automobile Journal.



POSITIVE DELIVERIES

THE Cole Motor Car Company

has contracted with the Northway Motor Company for the latter's entire season's production on the new Cole-Northway eight-cylinder motor. And the great plant of the Northway company is already working twenty-four hours a day in certain of its departments in order to avoid any

possible slip up on the promised schedule.

The Cole Eight will be delivered in quantities during March even if it becomes necessary to install three eight-hour shifts in the Cole Factory.

There is no possible chance for disappointment on deliveries of the Cole Eight.

See this Car at the Brooklyn and Boston Shows

COLE MOTOR CAR COMPANY

Indianapolis

U. S. A.

\$1785



Accessory Specialists

OUR stock of automobile accessories, supplies and car equipment is of such proportions that we can at any time fill any order. Every personal or mail order is given like attention and is filled the day received. All shipments are packed so as to insure perfect delivery.

Quantity purchasing makes possible the lowest prices on standard goods and sales are made with the assurance of entire satisfaction.

Catalogue describing, illustrating and pricing hundreds of articles of motor vehicle equipment, accessories and supplies sent at request.

Distributors for Mohawk tires and Oilzum products. The tires of established mileage and the lubricants known for economy and quality.

GREEN & SWETT

DEALERS AND JOBBERS

737 Boylston Street

BOSTON, MASS.



When Writing to Advertisers, Please Mention The Automobile Journal.



The NEW BRAENDER

Bull Dog

NON-SKID

**No Side Skidding.
Increased Wearing Surface.**

*The Fastest, Safest, Smoothest
Riding and Most Durable
Tire Made.*

**Braender Net Prices to
Car Owners**

Tires	Plain.	Non-Skid	Gray Tube.	Red Tube.
30 x 3	9.00	10.35	2.35	2.60
30 x 3½	11.00	13.35	2.70	3.00
32 x 3½	13.35	15.35	2.80	3.10
33 x 4	19.05	21.90	3.90	4.35
34 x 4	19.40	22.30	4.00	4.45
36 x 4½	27.35	31.45	5.20	5.80
37 x 5	32.30	37.15	6.30	7.00

BRAENDER Rubber and Tire Co.

(Direct Factory Representation Agents Solicited for
Principal New England Cities)

Factory: RUTHERFORD, N. J.

New York Office: 250 W. 54th St., New York,

AGENTS

The Alfredal Co., 1467 S. Michigan Ave., Chicago, Ill.

Motor Accessories Co., 6521 Euclid Ave., Cleveland, O.

Southwestern Rubber Co., 902 Main St., Houston, Tex.

Mohawk Valley Supply Co., Herkimer, Syracuse, Little Falls and Utica, N. Y.

Franklin Rubber Co., 265 N. 4th St., Columbus, O.

Ketcham & Lawrie, 259 Halsey St., Newark, N. J.

E. B. Quarles & Co., Charles and 20th Sts., Baltimore, Md.

G. H. Snyder, 465 Fulton St., Troy, N. Y.

Asheville Steam Vulcanizing Co., 5 East College St., Asheville, N. C.

Charles A. Midelburg, Charleston, W. Va.

Stevens Hotel Co., Lake Placid, N. Y.

Gross Hardware Co., 126 Grand Ave., Milwaukee, Wis.

J. R. Johnson, Greenwich, Conn.

Queens' County Tire Repair Company, 100 Broadway, Flushing, N. Y.

 **Will Exhibit at BOSTON SHOW, Space No. 605, Dept. G**

(When Writing to Advertisers, Please Mention The Automobile Journal.)



NATIONAL CAR sales are breaking all records this season—and on top of a 45% increase in 1914. There is absolutely no question about Nationals selling better than ever—the **only** question is: “are you going to be the dealer who profits by the National’s fame and success?”

NATIONAL SIX \$2375.00

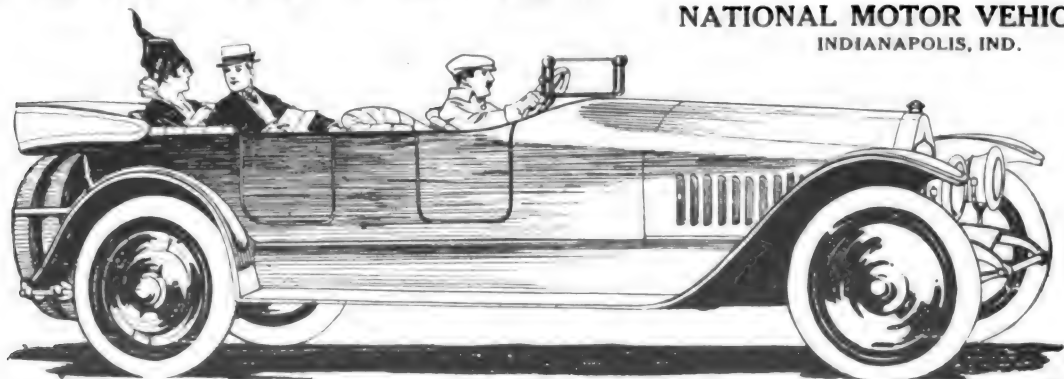
Seven distinct styles—Roadster or Touring Cars with divided front seats and disappearing auxiliary seats. Special bodies up to \$2850.00 including Coupe, Cabriolet and Parlor Car with individual adjustable arm chairs. **National** Sixes develop any part of 55 H. P. at a fuel efficiency up to 17 miles per gallon.

A. T. HART CO.,
1020 Boylston St.,
BOSTON, MASS.

J. C. TUCKER,
272 W. Exchange St.,
PROVIDENCE, R. I.

W. C. WIGGINS,
1147 Main St.,
WORCESTER, MASS.

NATIONAL MOTOR VEHICLE CO.
INDIANAPOLIS, IND.



When Writing to Advertisers, Please Mention The Automobile Journal.



QUICK SALES

DEALERS are entitled to success and prosperity—Auburn dealers enjoy both. Experience taught them that *money is made thru quick sales*. They used to handle cars that people admired but somehow would hesitate, delay, dicker around, and finally not buy. They have handled cars that had good looks and good mechanical features—but price was too high, or it took too much time, hard labor, and talk to sell them.

Dealers whose hard work is not rewarded with enough sales, should get the Auburn and get into the money-making class. For this car is the happy combination of mechanical goodness, stylish appearance and up-to-date comfort and equipment that *closes sales quickly*. Buyers who have hunted for the proper car at the right price decide the minute they know the Auburn. Auburn cars move off the salesroom floor fast. Join the quick-sale class by writing us today and getting all the Auburn facts—learn about the solid institution back of the Auburn car.

Your inquiry will not be answered by a "stock" letter, but you will receive personal attention direct from the executives, and instantly.

Liberal Specifications

Auburn specifications are liberal and up-to-date—but the best "feature" is the confidence you can place in this fifteen year old successful and reliable institution. "Integrity" is not listed as an Auburn specification, but it is the biggest thing you get. For if you don't get honest materials, honest workmanship and honest values you get a poor car no matter what its specifications or price. The Auburn is not cheap because the price is low, *but cheap because the car is good*. Four \$1075 and Six \$1550.

Powerful motor, either Four or Six Cylinders, cast en bloc.

Electric Starter.

Electric Lights.

Stream line bodies.

Access to all four doors.

Instrument board in cowl dash.

Tonneau longer and wider.

Seats larger and upholstery deeper.

Windshield, electric horn, and simple and convenient one man top with boot.

Left side drive and center control.

Crown fenders.

Jump-spark ignition.

Gear driven, centrifugal pump, water cooling.

Wheelbase, 126 inches for Six, 114 for Four.

Springs, semi-elliptic front, 3-4 elliptic, rear.

Demountable rims: tires, 34x4 for Six; 32x4 for Four.

Complete equipment without extra cost.

Built by Auburn Automobile Company, Auburn, Ind.

Mass. Motor Sales Co., 97 Brazer Bldg., Boston, Mass.

F. W. Wright, Inc., 250 W. 54th St., New York City

A SAFETY DEVICE

PROTECT YOUR CAR AGAINST THEFT

By Locking Gauge
at the Zero Point
Car Cannot Be
Driven.

FINES

The Set Lock Is Evi-
dence of the High-
est Possible Speed
Your Car Could Be
Driven.



PROTECT YOUR FAM- ILY AGAINST SPEEDING

Set Gauge at Speed
Above Which You
Would Feel Restless
to Have Any of
Your Family Driven.

ABUSE

Car Can Be Locked
at Low Speed When
in Strange Hands.

THE HOFFECKER SPEEDLOCK

This Attachment to the Hoffeecker Speedometer
Is Controlled by the Speedometer Governor and
Has the Same Action on the Throttle as a Driver
—Automatically Releasing the Throttle When
Slower Speed Is Desired and Securing Throttle
to Entirely Inactive Position When Car Is to Be
Left Alone—

COSTS LESS THAN ONE FINE

WRITE FOR CATALOGUE

THE HOFFECKER COMPANY

MOTOR MART BUILDING

BOSTON, MASS.

STUTZ

THE FIRST AMERICAN CAR

RACED only to develop design and construction, not merely to obtain sporting supremacy, STUTZ cars have been perfected and proven mechanically, until they are acknowledged by Motor-dom to be

Ideal for Every Service

The quality and finish of STUTZ cars are equally as well known as their records.

FOUR-CYLINDER

H. C. S. Roadster	\$1475
Beaumont	2000
Roadster	2000
Bulldog	2250
Touring	2275
Sedan	3675

SIX-CYLINDER

Beaumont	\$2125
Roadster	2125
Touring	2400
Sedan	3800

Every STUTZ Dealer has the best line in the market. Learn the merits of STUTZ agency proposition by writing for it today.

STUTZ MOTOR CAR CO., Indianapolis, Ind.



TOURING
4 Cyl. \$2275. 6 Cyl. \$2400.

When Writing to Advertisers, Please Mention The Automobile Journal.

CROSSING *THE* ROCKIES ON POLARINE



The steep, rocky grades and snowy passes of this long trip through the Rockies demanded an oil that cylinder heat would not break up, that would not congeal, that would keep the engine running true and strong.

The oil chosen was

Polarine

The standard oil for all motors—the oil for your car.

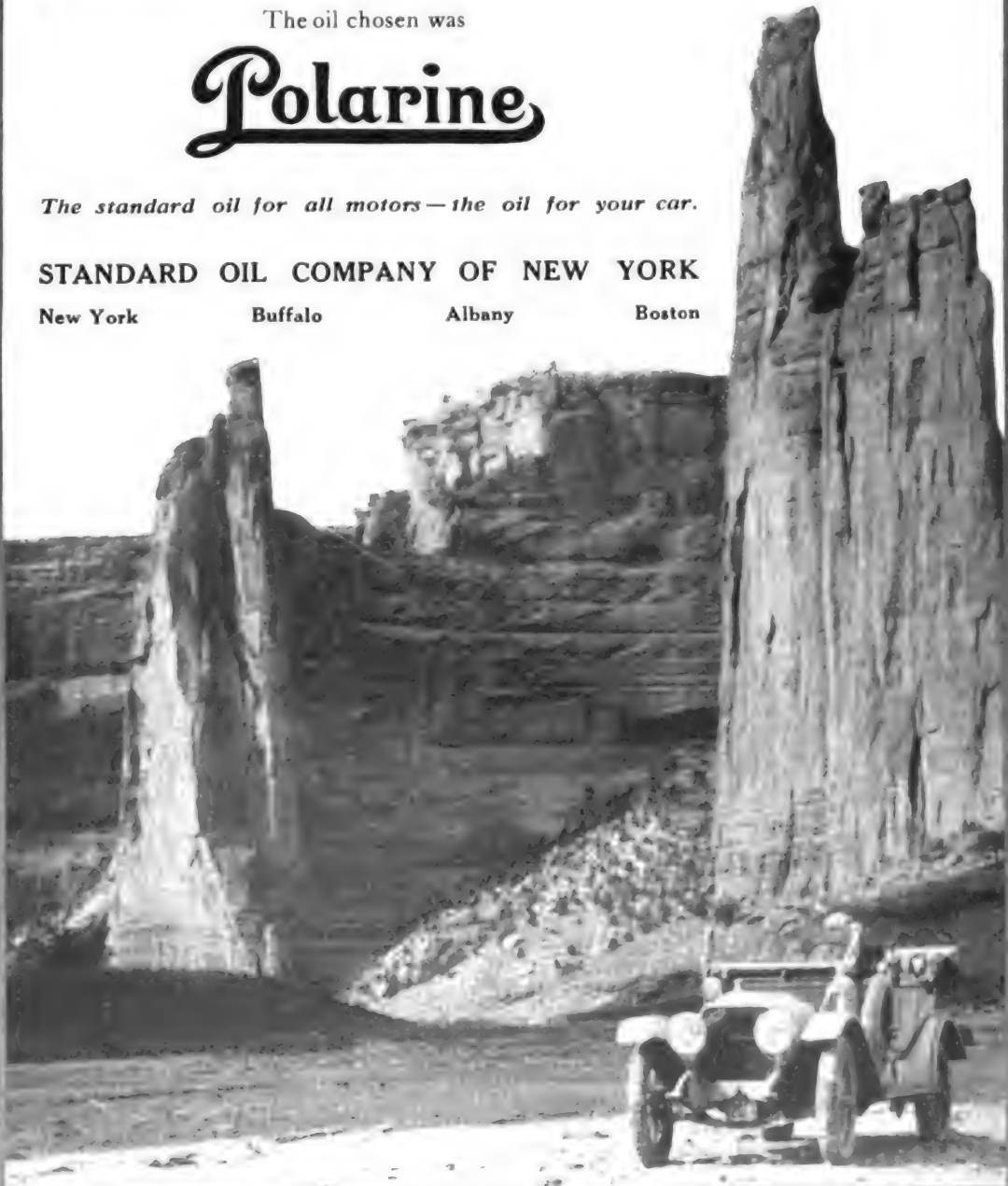
STANDARD OIL COMPANY OF NEW YORK

New York

Buffalo

Albany

Boston





The new Type G-4 Waterproof Magneto with its wonderful spark at slow speed will be shown as well as the other well known Eisemann Magnetos with and without Automatic Spark Advance.

Ford Owners should see our Outfit with which is offered either a single or dual system magneto. The standard magnetos used in connection permit of easy starting increased power and flexibility in addition to a real saving in gasoline consumption.

Other Eisemann accessories such as adjustable, flexible couplings, switches, terminal forming tools etc. will be shown.

THE EISNER-LENK CO.

1074 Boylston St.

Boston, Mass.

New England Service and Sales
Representatives For

The Eisemann Magneto Co.
Brooklyn, N. Y.

SPACE 506
DEPT. F.
BOSTON SHOW



When Writing to Advertisers, Please Mention The Automobile Journal.

15% SAVED



IN CAR FIRE INSURANCE



Your insurance company will insure your car against fire loss for 15 per cent. less than the standard rate if it is equipped with a Pyrene Fire Extinguisher.

The efficiency of the Pyrene Fire Extinguisher is demonstrated by the confidence of the National Board of Fire Underwriters in this equipment.

An owner whose car is equipped with a Pyrene Fire Extinguisher is protected against fire loss on the car, against loss of car service, and the property in which the car may be is also protected, and life safeguarded as well.

A Pyrene Fire Extinguisher is light in weight, requires little space, can be carried conveniently in any car, and its service is an indefinite period.

Pyrene Brass and Nickel Plated Fire Extinguishers, one quart capacity, are included in the lists of approved fire appliances issued by the National Board of Fire Underwriters.

Pyrene Company of New England

88 Broad Street

Boston, Mass.

When Writing to Advertisers, Please Mention The Automobile Journal.



EIGHT CYLINDER KING

\$1350
Complete

40-45
Horse-Power

It's a King Year in Motordom

The "world's first popular-priced Eight" is the most wanted car of its class because—

It is the *only* moderate-priced Eight ready for immediate delivery.

It is the *only* moderate-priced Eight with demonstrators the country over.

It is of King design and King efficiency and is built in the King factory by King workmen.

It is the *only* Eight that is completely get-at-able. Camshaft and valve guides exposed in a moment.

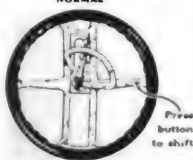
It has hundreds of miles of grueling road tests behind it.

It is built by a financially solid organization with a reputation for dependable cars.

A ride in it spoils you for other cars—one demonstration proves this.

NEVILLE'S "MORE-ROOM" STEERING WHEEL EXCLUSIVE KING FEATURE

TOP VIEW
NORMAL



Pushed out of way for easy entrance and exit.

May be set at different positions for driving.

SIDE VIEW
NORMAL



Absolutely rigid in any position. Nothing to wear out or loosen.

America's Original Cantilever Spring Car

DEALERS: Applications for territory will be considered strictly in the order received.

King Motor Car Co.
Detroit, Mich.

New England Agency and Service Department
650 Beacon St., Boston

When Writing to Advertisers, Please Mention The Automobile Journal.



Wrenches Are Made Right, Stay Right,
Last a Lifetime, and are 30% Stronger
Than Any Other.

“COES” on any Wrench Means Quality,
Best Material and Finest Workmanship.
An Inspected and Tested Wrench. The
Ironclad “COES” Guarantee for Strength
and Finish.

The “COES” Automobile Model are for Motorists
and Repairmen. For Service Specify “COES” No
Tool Kit or Repairshop is Complete Without One.

Ease of Handling Without Fear of Slipping or Bruis-
ing. Perfect Balance and Certain Grip has made the
“COES” the Most Widely Used Tool of the Kind in
the World.

COES WRENCH CO.

WORCESTER MASS.

J.C. McCARTY & CO.

JOHN H. GRAHAM & CO.

29 Murray St. New York City

113 Chambers St. New York City

\$2.50



SEARCHLIGHT

Small, Compact, Strong and Efficient

The Season's Best Seller

For touring it is indispensable, guideboards and signs read without difficulty.

For delivery trucks it is a great time saver as it allows the driver to "spot" house numbers without leaving his seat.

It will fit any car. The price is right. The Lamps are ready for delivery.

We have an attractive Dealers' proposition.

Write for it.

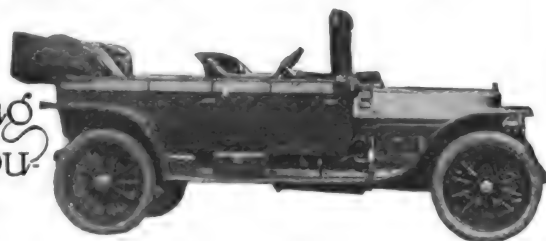
CULVER-STEARNS MFG. CO.

WORCESTER, MASS.

DETROIT, MICH.

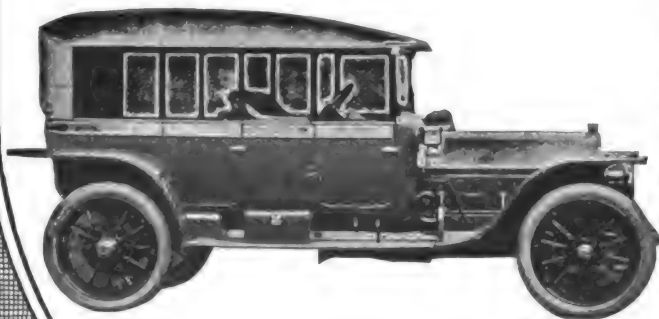
When Writing to Advertisers, Please Mention The Automobile Journal.

The comfort of every car body combined. An instantaneously convertible equipment that affords a touring body or a limousine whenever desired.



Changes can be made on the road as readily as in the garage. No matter what the occasion or requirement, your car with the

SPRINGFIELD CONVERTIBLE BODY is always ready and always has



the accommodation and protection you desire.

Can be raised or lowered

as easily as folding top.

SPRINGFIELD METAL BODY CO.

SPRINGFIELD

MASS.

The largest exclusive supply house in New England

Waite

Auto Supply Company

GUARANTEED ACCESSORIES AND SUPPLIES

Every Article Carefully
Selected, Low Priced and
Absolutely Up-to-date.

A New Store. Clean New Stock.

Wise Motorists Buy from the Big Waite Catalogue, which describes, illustrates and prices every accessory, supply and equipment necessary for motor vehicle convenience or comfort.

Three Minutes to Every Shipping Point Means Quick Delivery. Every order filled the day received. No house can equal our service. No order too small to receive fullest attention.

A postal request will bring the latest Waite Dealers' and Agents' catalogue and trade price list,

WAITE AUTO SUPPLY COMPANY

64 Exchange Place, Providence, R. I.

Telephones: Union, 7211-7212 Cable Address "Wasco."



DISTRIBUTORS:—

Rayfield Carburetors, Atwater-Kent Systems, Splittorf Magneto Parts, Batavia Tires, Empire Tires, Success Dry Cells, Success Spark Plugs, Klaxon Electric Horns, Automobile Springs, Overhead Washers, Machine and Hand Tools, Garage Air Compressors, Gasoline Storage Systems, Leak-Proof Piston Rings, Weed Chain Tire Grips, Chain Hoists, Tap and Die Sets, Cap Screws, Stove Bolts, Spring Clips, Vises, Tapers, Straight and Expanding Reamers, Endura Packings, Stick and Wire Solders, Copper Rivets, Files, Hammers, Chisels, Punches, Ford Accessories, Towing and Lifting Jacks, 20-ton Presses, etc., etc., etc.

When Writing to Advertisers, Please Mention The Automobile Journal.



NEW DEPARTURE BALL BEARINGS

American Made for American Trade

The leadership of New Departure Ball Bearings is based upon their own worth, upon their ability to stand up to the work they are designed to do, and upon the expert and whole-souled service that is bestowed by the manufacturer upon the original purchaser and the ultimate user of them.



**The New Departure
Manufacturing Company**
Bristol, Connecticut, U. S. A.

Distributors in Trade Centers
throughout the United States

Western Branch: 1016-17 Ford Bldg., Detroit, Mich.



When Writing to Advertisers, Please Mention The Automobile Journal.

See
The

DORT

At The
Boston Show

The two "DORT" Models are handsome, sturdy, dependable cars; built by a maker of twenty-eight years' successful manufacturing experience. As an assurance of the reliability of this company's products, it is enough to say that the stockholders and officers of the Dort Motor Car Company are the same as those of the well-known Durant-Dort Carriage Co.

Motors in both cars are designed and built along the same lines, cast en bloc. Bore and stroke of five-passenger car are $3\frac{1}{4}$ inch x 5 inch; those of the roadster are 3 inch x 4 inch. Crank shaft is unusually heavy with extremely large bearings. Wonderful cooling qualities. Water jackets very large. Each cylinder barrel is independent from the others. Water circulates all around them. Valve cages are also completely water-jacketed. Additional ef-

iciency secured by double exhaust manifold which entirely eliminates back pressure.

Transmission of three speeds forward, selective type, bolted to rear of motor, forming Unit Power Plant. Three-point suspended.

Every ounce of power developed by the motor is transmitted to rear wheels through gears and shafts of nickel steel.

Entire assembly very simple. Each working part easily accessible. All materials used are of the most durable grade.

Bodies are designed along most advanced lines. They carry out the stream-line effect to perfection. Ample leg room in both models.

Floating cantilever spring suspension, together with deep upholstery, gives most splendid riding qualities.

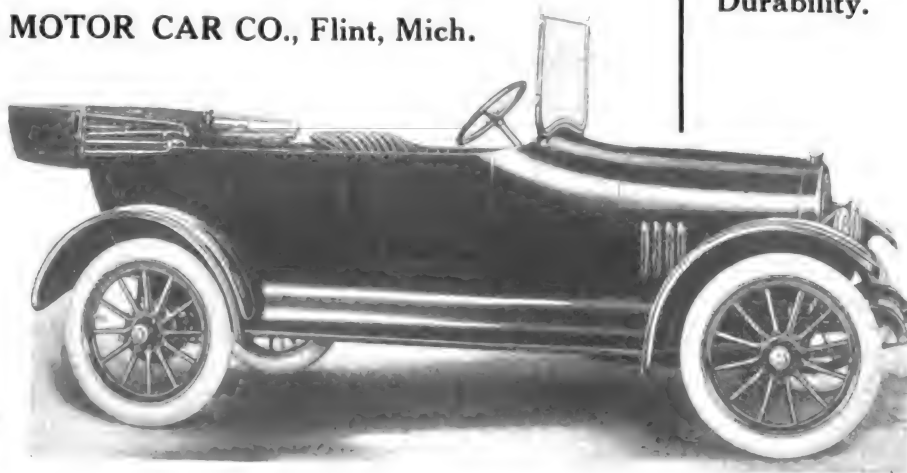
Jno. D. Mansfield, General Sales Manager, in charge of exhibit

DORT MOTOR CAR CO., Flint, Mich.

**Five
Passenger
Touring
\$680**

**Two
Passenger
Roadster
\$495**

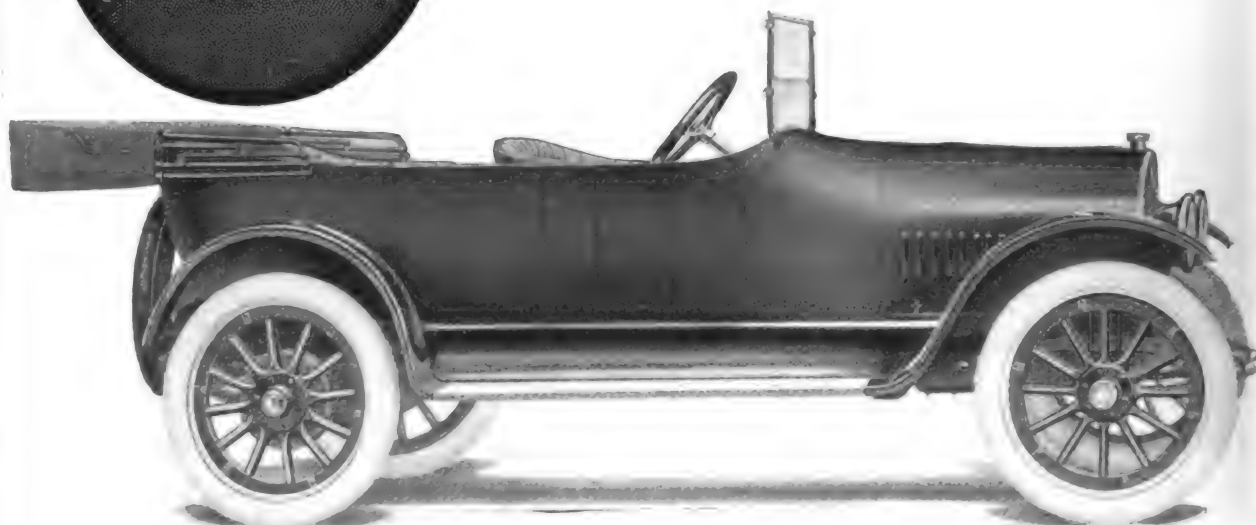
**The Acme of
Simplicity,
Accessibility,
Durability.**



When Writing to Advertisers, Please Mention The Automobile Journal.



Several thousand motor car purchasers will refuse to experiment this year. They will buy a sturdy Jackson, up-to-date in style and equipment, but old-fashioned in honest workmanship.



The New Jackson "44" Offers \$1250 High Quality in Known Quantity—

IT is unfortunate that a photograph so inadequately expresses the beautiful lines and lustrous, lasting finish of this latest Jackson. In the Jackson "44" we have attained all that one could ask in beauty, of line and proportion, without sacrificing in any degree the old-time sturdiness of construction and simple honesty of workmanship for which the Jackson has been famous these thirteen years.

All the refinements are complete—flush doors, concealed hinges, one-man top, two-piece rain-vision windshield, crowned fenders and rounded radiator front. Ignition and lighting switches, speedometer, ammeter and oil gauge are grouped on a metal instrument plate in the center of the dash, all illuminated by one dash light.

SPECIFICATIONS, MODEL "44"—Long stroke, four-cylinder motor, 40 H. P., Auto-Lite electric cranking, lighting and ignition system. Gasoline tank at the rear, vacuum feed. Steering wheel on left side, control levers in the center. Either front door may be used. Full elliptic springs front and rear, underslung in rear. Rear axle, floating type, two universal joints. Wheel base, 115-inch. Tires, 34x4-inch.

Jackson "48" -Six---\$1650

Jackson Olympic "46"---\$1375

Catalogue on Request

DEALERS: The Jackson offers splendid and permanently profitable sales opportunities. Get in touch with us now.

JACKSON AUTOMOBILE COMPANY

1221 East Main Street, Jackson, Michigan



The advertisement features a black and white photograph of a Massachusetts liability policy and a license plate. The policy is from the Massachusetts Bonding and Insurance Company, No. P 4970, issued to a driver. The license plate is PH 1652, 1915. Below the image, the text reads: 'YOUR POLICY PROTECTS YOU THE LAW DOES NOT ACCEPT EXCUSES NUMBER IDENTIFIES YOU'. It then states: 'Your Responsibility Is Fixed and You Know the Possibilities Good intentions and extreme care do not lessen liability nor prevent accident Insurance is the only safeguard you can provide'. A paragraph explains that the company's policies provide protection, defend against litigation, and indemnify against financial loss. Another paragraph states the company has \$2,000,000 in capital and specializes in protection for car owners. The company name, address (77-85 State St., Boston, Mass.), and president (T. J. Falvey) are listed. A coupon for a quote is at the bottom right.

YOUR **POLICY PROTECTS YOU**
THE LAW DOES NOT ACCEPT EXCUSES **NUMBER IDENTIFIES YOU**

Your Responsibility Is Fixed and You Know the Possibilities
Good intentions and extreme care do not lessen liability nor prevent accident
Insurance is the only safeguard you can provide

Massachusetts Bonding and Insurance Company policies will afford every protection, defend you against litigation, and indemnify you against financial loss. They guarantee you against all financial responsibility within policy limits for a given period, and avert publicity, and all consequences that might annoy or cause loss of time.

This company has \$2,000,000 paid in capital and an organization that specializes protection for the car owner. Its resources are equally at the command of every policy holder.

Massachusetts Bonding & Insurance Co.
T. J. Falvey, President
77-85 STATE ST. BOSTON, MASS.

PLEASE QUOTE WITHOUT OBLIGATION ON MY PART, RATES FOR AUTOMOBILE LIABILITY AND PROPERTY DAMAGE INSURANCE ON CAR DESCRIBED AS FOLLOWS:

DESCRIPTION, TRADE NAME AND TYPE OF BODY	MODEL NO. OR LETTER	YEAR OF MAKE
EXPIRATION DATE OF PRESENT POLICY		
NAME		
ADDRESS		

When Writing to Advertisers, Please Mention The Automobile Journal.

The A. J. Automobile Library

(Including All of the Famous A. B. C. Books)

A Complete Library of
Automobile Mechanics **\$4.75**

Transportation Charges Prepaid

Distinct Books—1000 Pages of Text—All Copies Indexed—2000 Illustrations,
Including Practical Working Page Charts and Trouble Finders.

Books written by recognized authorities. Especially prepared for those
who have to do with the sale, care, repair and operation of motor vehicles,
their parts, equipment, accessories, etc.

The practical information in these works cannot be secured through any other
series or number of books or for 50 times what is charged for this library.



Engine . . .	35c	Chassis . . .	25c
Magneto . . .	35c	Lighting . . .	50c
Carburetor . . .	35c	Operation . . .	50c
Battery . . .	35c	Overhauling . . .	50c
Tires . . .	25c	Motorcycle . . .	35c

Truck Operation \$1.00

Automobile Journal Publishing Company

Times Building

Pawtucket, R. I.

THE MOTOR CAR EQUIPMENT CO.

Successors to BI-MOTOR EQUIPMENT CO.

*Largest and only EXCLUSIVELY WHOLESALE
Accessory Supply House in the New England States*

SOLE DISTRIBUTORS: Diamond Drive Chains,
Topping Jacks, and other important items.



DEALERS: We have the stock, the organization, and the desire to be of maximum service to you. More than this, we guarantee you complete protection, since we will neither solicit the consumers' business nor accept it if offered. Have you talked with us?

THE MOTOR CAR EQUIPMENT CO.

180-182 Massachusetts Avenue, Boston, Mass.

55 Warren St., NEW YORK.

21 Halsey St., NEWARK, N. J.

When Writing to Advertisers, Please Mention The Automobile Journal.

Index to Advertisers.

Page	Page
Ahlberg Bearing Co.....81	Mossberg Co., Frank.....76
Alsten & Goulding Co.....18	Motor Car Equipment Co.....43
Auburn Automobile Co.....27	Motor Parts Co.....14-15
	Motor Specialties Co.....79
Barrett Manufacturing Co.....91	National Motor Vehicle Co.....26
Bosch Magneto Co.....93	New Departure Mfg. Co.....38-88
Boston Auto Show.....2	New Lite Mfg. Co.....84
Boyd, F. Shirley.....89	Nordyke & Marmon.....94
Braender Rubber & Tire Co.....25	N.-Y. & N. J. Lubricant Co.....90
Coes Wrench Co.....34	Palge Detroit Motor Car Co.....89
Cole Motor Car Co.....22-23	Penn. Rubber Co.....Cover
Continental Asbestos Corp.....12-13	Peerless Motor Car Co.....94
Cotton, L. M., Inc.....84	Pierce-Arrow Motor Car Co.....Cover
Culver Stearns Co.....35	Premier Motor Car Co.....47
Dixon Crucible Co., Jos.....89	Pyrene Co. of N. E.....32
Dort Motor Car Co.....39	
Dover Stamping & Mfg. Co.....20	Royal Equipment Co.....Cover
Eagle Oil & Supply Co.....8-9	Russell Mfg. Co.....94
Eisemann Magneto Co.....31	
Ellis-Ward Co., The.....10	Sager Co., J. H.....90
Garford Mfg. Co.....93	Salvador Motor Co., The.....89
Goodyear Tire & Rubber Co.....45	Saxon Motor Car Co., The 4-5-6-7
Gray & Davis, Inc.....81	Scripps Booth Co., The.....96
Green & Swett Co., The.....24	Silvex Company.....93
Gulf Refining Co.....95	Smith & Bros. Typewriter Co., L. C.....16
Harding Distributing Co.....90	Spiltdorf Electric Co.....95
Harris Oil Co., A. W.....3	Springfield Body Co.....36
Heinze Electric Co.....89	Standard Oil Co.....30
Hoffecker Speedlock Co.....28	Standard Woven Fabric Co.....Cover
Hotel Lenox.....21	Staybestos Mfg. Co., The.....92
Hotel Tuller.....91	Stevens & Co.....89
	Studebaker Corp.....91
Inter-State Motor Co.....11	Stutz Motor Car Co.....29
	Superior Mfg. Co.....94
Jackson Automobile Co.....40	Texas Oil Co., The.....19
	Times Square Automobile Co.....44
King Motor Car Co.....33	Tuller Hotel.....91
Lenox Hotel.....21	Valvoline Oil Co.....88
Liberty Bell Co.....88	Vanderpool Company, The.....44
Marburg Bros.....89	Waite Auto Supply Co.....37
Mass. Bond. & Ins. Co.....41	Weed Chain Tire Grip Co.....48
Mea Magneto Co.....89	Willys-Overland Co.....17
Metz Company.....90	
Miller Rubber Co.....91	Zenith Carburetor Co.....1

FOR SALE.

**Shop Vulcanizer, Bargain.
Vanderpool, Springfield, O.**

We sell everything pertaining to the automobile at half regular prices. Send for our great "PRICE WRECKER" No. 5, containing 3000 auto bargains at cut prices. **TIMES SQUARE AUTOMOBILE Co.** World's largest dealers. S. W. Cor. 56th St. and Broadway, N. Y. 1210 Michigan Avenue, Chicago.

Accessory and Garage Journal

Only Trade Readers

20,000 Copies

**EACH MONTH
GUARANTEED**

Unequalled in Its Field

Write for Proof and Rates

Automobile Journal Big Boston Show Number

February 25
Advance

March 10
Review

Effective February 1

Reduction No. 3

On Goodyear Tires

**Making Total Reductions 45 Per Cent. in Two Years
To Give Always the Most for the Money**

We are glad again—for the third time in two years—to announce a big reduction on Goodyear tires, effective February 1st.

Goodyear policy on price is to give the utmost in a tire at the lowest possible profit. Our reductions are made to that end, without ever reducing the quality.

That always means, with our matchless output, more for the money than any other maker can give.

As rubber came down our prices came down. As our output multiplied, reducing factory cost, our prices came down with it. In two years our reductions—including the present—have totaled 45 per cent.

Last year we increased our output 26.6 per cent. A few days ago the embargo on rubber was modified so that supplies seem assured. The market price for rubber seems for a time established. Fabric costs less than last year. So, under our minimum profit policy, we announce this new reduction.

Only Fair Basis

We consider profit margin on a tire the only fair price basis. We keep that margin just as low as our line allows.

While we do that, Goodyear tires will always undersell any tires that compare with them. That is because we have the largest output. We have a new factory, modernly equipped. And we have world-wide facilities for buying rubber, of our extra grade, at the lowest market price.

For a long, long time most tires have sold much above Goodyear prices. Some have sold one-third higher. A few have sold lower, as some always will, because of less rubber, less quality. But we can and do, under all conditions, give more for the money than any rival tire can offer.

(2232)

The Best We Know

Goodyear Fortified Tires offer the best we know. They are built to give you the lowest cost per mile. They minimize tire trouble in five costly ways employed by no other maker. And they are always the same, regardless of price reductions.

Most tires will always sell higher, because of smaller output. Some tires will always sell lower because of lower standards. But we promise you that none will ever give better than Goodyear value.

This policy has made Goodyears the largest-selling tires in the world. It will make them more so as more men find them out.

Ask your Goodyear dealer for our new price on the size you buy.

THE GOODYEAR TIRE & RUBBER CO.
Akron, Ohio

Makers of Goodyear Tire Saver Accessories and Goodyear Wing Carriage Tires and Other Types



GOOD YEAR

AKRON, OHIO

Fortified Tires

Fortified Against

{

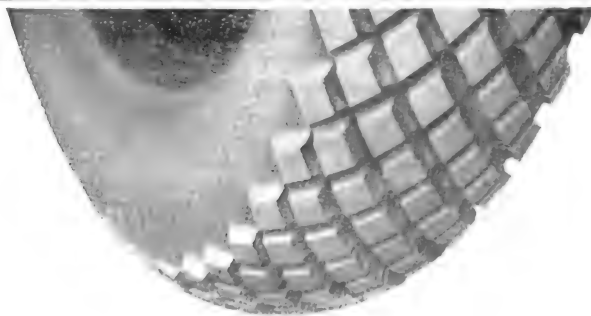
Rim-Cuts—by our No-Rim-Cut feature

Blowouts—by our "On-Air" cure.

Loose Trends—by many rubber rivets.

Insecurity—by 126 braided piano wires.

Punctures and Skidding—by our double-thick All-Weather tread.



When Writing to Advertisers, Please Mention The Automobile Journal.

PUBLISHER'S AND READER'S PAGE.

The Present Issue of The Automobile Journal is a guide for all who shall visit the 13th annual Boston automobile show. It contains a complete list of all who will have exhibits at Mechanics' building this year, and the numbers of the spaces allotted to them. In it the reader will also find complete specifications of every pleasure car made in America. These specifications are printed in convenient form, and those contemplating purchasing a new car will find them extremely useful. In these are given complete mechanical data, together with the price of each model. On page 31 may be found an index of each gasoline and electric model for both the specification and illustration. On the following page the names and addresses of all gasoline car manufacturers are given, and this will serve those who desire to correspond with manufacturers.

Another interesting feature of the current issue is a discussion of eight-cylinder models. Since the announcement of the production of the first American eight last fall, the motoring world has been interested in the development of new types, which are regarded as having peculiar qualities. This article is the most complete dealing with eight-cylinder motors that has been published to date.

It would be well to keep in mind that the Touring Number of The Automobile Journal will be printed early in July. This will be replete with road information, routes, etc., brought up to the last minute.

The Correspondence Department is one of the most popular and interesting in The Automobile Journal. Through it hundreds of readers have sought advice, and it has served as a clearing house for practical information. This department is of particular benefit

to the owner who makes his own repairs and solves his own problems. Because many letters received by the editor of correspondence do not deal with mechanical subjects, these are considered personally. For this reason the inquirer should always send name and address. These may, however, be published if the questions are of special interest.

It is the purpose of the editor of The Automobile Journal to publish in every issue articles dealing with the care, repair and operation of small cars. This department will be given over to owners who drive and repair their own machines.

The completion of the Lincoln highway, and the general improvement of roads means that the car owner may travel from the Atlantic coast to the Panama-Pacific International Exposition over good thoroughfares. The Automobile Journal's Touring department has available complete road data, and the motorist who desires special information may avail himself of its resources at any time by addressing that department. One section of the magazine, devoted to legislation and laws, keeps pace with proposed revision of statutes and in this issue is a digest of changes proposed to date in different states.

The Advertising Section of The Automobile Journal is the market place for the reader, as it tells him of every desirable accessory, equipment or supply for the motor car. These pages are of special interest to every owner. A glance will show the best the industries produce and from whom these can be obtained. Reference to these pages will afford information that will suggest all that is new, and what has been developed to increase the pleasure and comfort of motoring.

Partial Table of Contents.

	Page
*Prosperity	1
*Mechanical Features of the 1915 Models	9
Body Styles Being Offered This Year...	25
Index to Pleasure Car Specifications and Illustrations	31
Addresses of Gasoline Car Makers.....	32
*General News of the Industry.....	33
*New Accessories for the Motorist.....	37
New and Proposed Motoring Laws.....	39
*Chattanooga the Centre of Roads Work	44
*Lapan Trouble Chart.....	46
*Correspondence with the Reader.....	48
Editorials	50
*Motor Starting Systems for 1915.....	51
*Announce New Type of Zenith Carburetor	56
*New Tools, Supplies and Equipment....	58
*Pullman Junior a New Light Model....	60
*Mechanical Notes for Owners.....	62
*Boston's Big National Automobile Show	65
*Complete List of Boston Automobile Show Exhibitors	65
*Eight-Cylinder Motor Firing Orders....	69
*Lubricating the Model T Ford.....	77
*Suggestions for the New Car Owner....	82
*Vanderbilt Cup Race Postponed.....	86

*Indicates article is illustrated.

SUBSCRIPTION BLANK.

Date _____

AUTOMOBILE JOURNAL PUBLISHING CO.,

TIMES BUILDING, PAWTUCKET, R. I.

Enter Order for the Following Publications:

(Designate by marking X in Space at Left of Titles)

—The Automobile Journal (Subscription, one year)..... 0 \$1.50
 —The Motor Truck (Subscription, one year)..... 0 \$2.00
 —The Accessory and Garage Journal (Subscription, one year).... 0 \$2.00

Make Remittances by Check, Bank Draft, Postoffice or Express Money Order or Stamps. All Money Enclosures Are at SENDER'S RISK.

Enter Price for Each Book Ordered

Name _____ Street _____

City or Town _____ County _____ State _____

ANNOUNCING

The New Model

6-50 PREMIER

At The New Price of

\$1985



SPECIFICATIONS:—Six cylinders, 50 to 90 horsepower; 132-inch wheel base; electric lights; Remy electric starter; handsome streamline body with modern V-type radiator; deep, luxurious upholstery; roomy, comfortable tonneau, easy of access; two-piece ventilating windshield; one-man top.

Stewart vacuum fuel system; Rayfield carburetor; Timken axles; silent gear shift; 60-inch springs, wonderful ram's horn intake manifold and multiple jet exhaust manifold, provides extraordinary flexibility and the maximum of power and economy.

This Great Big Premier at the New Price Removes Sales Resistance and is the Best Dealers' Proposition on the Market.

SEE IT AT THE BOSTON SHOW

Premier Motor Mfg. Company

Indianapolis

When Writing to Advertisers, Please Mention The Automobile Journal.



Living it over Again

In a mental picture, he reviews the accident—the result of his recklessness

He realizes too late that it is *always* foolhardy to motor on slippery roads and streets without equipping all four tires with

Weed Anti-Skid Chains

The Only Real Safeguard Against Skidding

Strange, is it not, that some men laugh at peril—they do not seek to avoid danger—and they have no fear because they have no prudence.

They continue to motor over sleety, icy, or wet roads and pavements with "Foolish Dependence Upon Bare Rubber Alone" until a false turn—a sudden meeting at a corner—a slip or a skid—brings disaster as the punishment for their imprudence.

You motorists with reasoning brains put on your Tire Chains at the first indication of slippery streets, and the editors of the daily

newspapers are urging *all* motorists to follow your example.

For instance, the Public Ledger of Philadelphia, Pa., published by the owners of The Saturday Evening Post, in an editorial on August 1st, 1914, said that the simple adjuration to "Use Tire Chains on wet and slippery pavements" deserved to find its way into a law, and that law should by all means be enforced.

Promote "Safety First" in YOUR motoring circle—insist that everyone use Weed Chains on ALL tires.

Weed Chain Tire Grip Co., Bridgeport, Conn.

Also Manufacturers of Tire Chains and Lyon Grips especially constructed for Single and Dual Solid Truck Tires—Motorcycle Tire Chains, etc.

Manufactured for Canada by

DOMINION CHAIN COMPANY, Limited—Head Office: Shaughnessy Bldg., Montreal, Can.



When Writing to Advertisers, Please Mention The Automobile Journal.



AUTOMOBILE JOURNAL

PROSPERITY

FROM the standpoint of the manufacturer, production and value of cars, domestic consumption, exports and total amount of investment, 1915 will be the greatest in the history of the automobile industry in the United States.

Overriding all obstacles that confronted it during the closing months of 1914, the automobile trade has come back into its own, and during the current year records will be established that were considered but dreams a few years back.

With conservative estimated production of pleasure and commercial cars totaling 750,000 for 1915, valued at approximately \$700,000,000, the motor car will more than duplicate its annual record since the inception of the trade.

Never once since its establishment in the latter years of the 19th century has its progress received a setback. Each successive year sees larger production, larger investment in plant and equipment and, above all larger payrolls for the army of the workers that constitute its backbone.

Characterized today as the country's greatest asset, the automobile has become a necessity and has securely intrenched itself in the social and

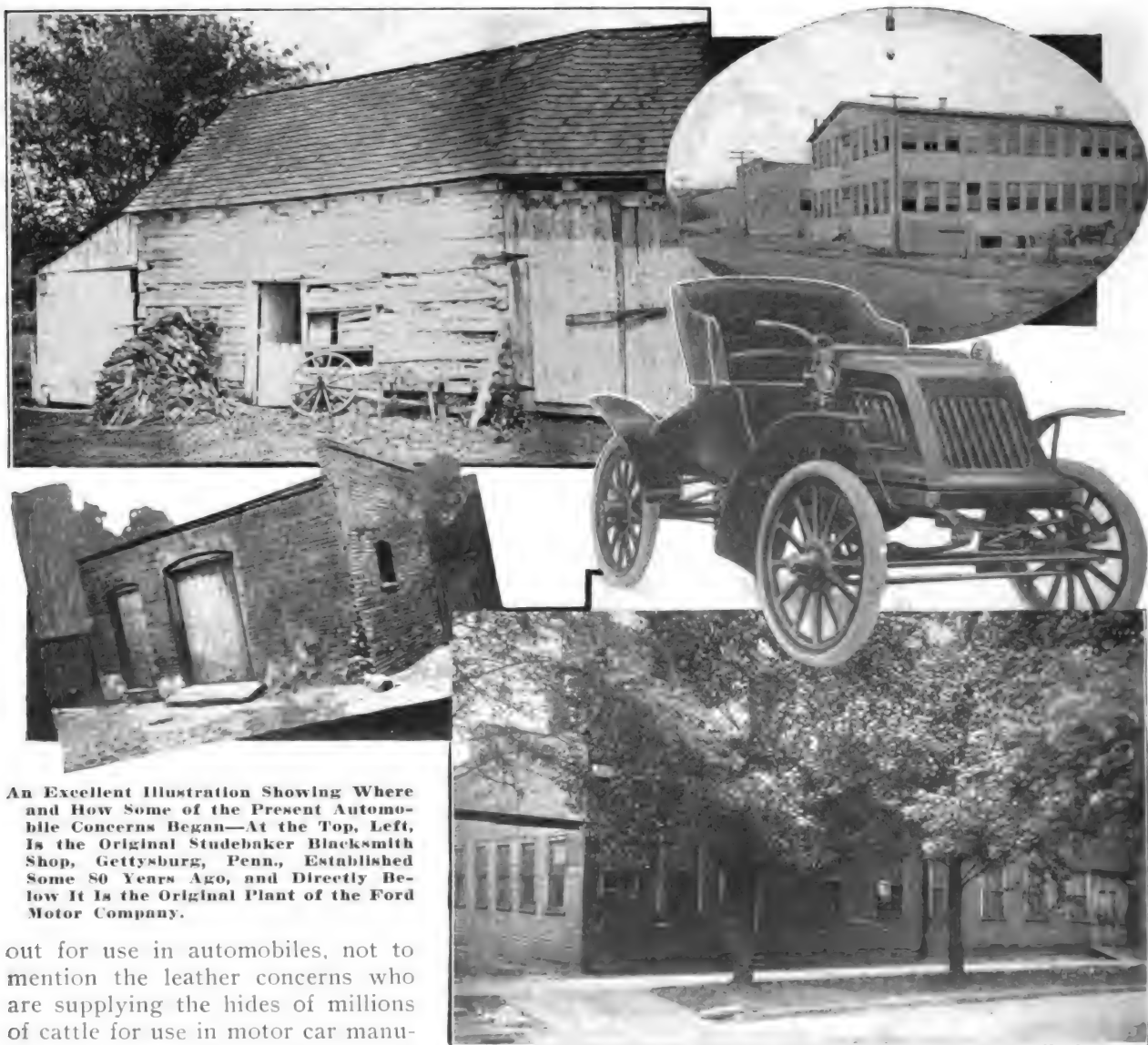
commercial life of the country. While the motor car industry proper has become the support of hundreds of thousands, it has carried an army of accessory and supply industries with it that are successfully and soundly capitalized into the billions. The 1,808,441 automobiles in the United States, valued at approximately \$2,000,000,000, turned \$11,925,245 into the coffers of the various state treasury departments during 1914. These

automobiles caused 9,000,000 tires to be produced, valued at \$300,000,000, and this alone gave work to thousands, besides making a profit and giving additional employment in the shops of the 15,500 dealers. Likewise, the 13,630 garages, 1280 repair shops and the 680 supply houses were carried on the flood of the automobile prosperity, and some 200,000 clocks are now being turned

plans of the United States automobile industry.

1. The European war.
2. The admitted general business depression in this country.
3. The stagnation of commercial affairs in the South as the result of the cotton situation.

While the financial skies undoubtedly looked black for a short period, yet these three factors



An Excellent Illustration Showing Where and How Some of the Present Automobile Concerns Began—At the Top, Left, Is the Original Studebaker Blacksmith Shop, Gettysburg, Penn., Established Some 80 Years Ago, and Directly Below It Is the Original Plant of the Ford Motor Company.

out for use in automobiles, not to mention the leather concerns who are supplying the hides of millions of cattle for use in motor car manufacture. A constant payroll, including over 250,000 men, is being carried by the automobile manufactures alone, and it is figured that 47 per cent. of the cost of automobiles is in labor, giving these men over \$300,000,000 for 1915.

In meeting the situation squarely, it is seen that during the latter part of 1915 the following three factors figured to wreck all fond hopes and

In the Oval at the Top of the Layout Is to Be Seen the First Packard Plant, Warren, O.; the Centre Picture Shows the First Car Made by the Willlys-Overland Company, a Two-Cylinder Affair, and the Lower Picture Depicts the Original Plant of the Hupp Motor Car Company.

have dissolved in a manner extremely favorable to the automobile industry. Taking these in the order named, it is seen that the European war has displaced the pleasure car exports but, since the beginning of the war, approximately 5000

trucks have been exported to the belligerent nations, valued at \$14,000,000. Consequently, while the export of pleasure cars will decrease,

ing that has followed the automobile has enabled the farmer to reduce the haulage cost of his products, with the result that larger profits have been realized by the tillers of the soil during the past few years. Just what this will mean to the automobile industry will be better appreciated when it is stated that there are 12,500,000 people engaged in agriculture in this country today.



The Mammoth Willlys-Overland Plant at Toledo, O., Where 75,000 Overlands Will Be Turned Out in 1915.

the commercial vehicle will more than make up the loss. This has kept the factories running day and night, and enabled the manufacturers to dispose of all surplus vehicles and turn them into cash at a time when cash was needed. Likewise, it adds to the army of workers in the export trade, and the domestic consumption will more than take care of itself.

The exceptional prosperity of the Middle West agricultural communities on account of the record crop values, and the establishment of the federal reserve, are rapidly relieving the financial stringency. Record crops and the favorable disposition of the farmer towards the motor car will amply take care of domestic sales, and without a

with the action of nearly every trade interest and individual effort, has carried the South over its critical period.

Prosperity for New England.

Added to this is the optimistic note throughout New England of the textile mills working full blast. The orders received from abroad are causing this industry to more than make up for the slack run of 1914, and as this constitutes the backbone of New England, it is seen that a new era of prosperity is due for this section also.

From the outline given above it is seen that financially the United States is righting itself and the market for automobiles is receiving an impetus as the result. Figures convincingly tell



At the Top Is a General View of the Ford Plant as It Stands Today and Below May Be Seen a Part of the Ford Army of Employees.

doubt 1915 will far exceed the past year in this respect. Over 50,000 of the 106,250 automobiles in Iowa and over 33 per cent. of the 53,161 machines in Wisconsin are owned by farmers. The era of good roads mak-



Bird's-Eye View of the Packard Motor Car Company Plant, Detroit, Mich., as It Looks Today.

the story of the way in which the automobile has become a leading factor in American life. A brief summary of the growth of the industry since 1900 shows:

	1914	1910	1900
Number of manufacturers	450	350	15
Production of cars...	515,000	130,000	4,000
Value of cars.....	\$485,000,000	\$250,000,000	\$5,000,000
Domestic consumption	450,000,000	238,800,000	4,850,000
Exports of cars.....	33,000,000	11,200,000	150,000

Another striking example that is graphically denoted in figures may be seen from the following comparison, showing how American manufacturers have climbed from \$5,502,214 exports in 1907 to \$33,198,806 in 1914.

	Exports of Cars	Imports of Cars
1907.....	\$5,502,241	\$4,842,279
1908.....	5,277,847	2,991,039
1909.....	5,992,200	3,679,134
1910.....	11,190,220	3,837,084
1911.....	15,509,229	2,250,759
1912.....	25,657,294	2,438,325
1913.....	31,253,533	2,023,207
1914.....	33,198,806	1,432,576

This wonderful record is undoubtedly due to the development of the low-priced car in Amer-

ica. A steady decline in the average price is one of the feature accomplishments of the American industry, which has been made possible by the wonderful quantity production. The price of the average car is placed at about \$980 today, as compared with \$2130 in 1907, and at the present time more than 50 per cent. of the cars produced sell for less than \$700.

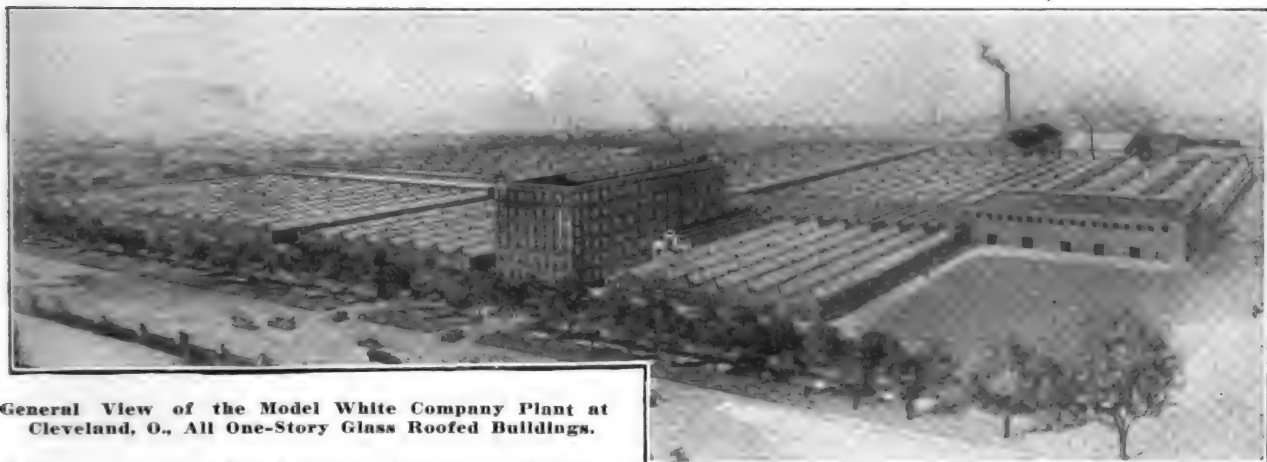
Public Confidence in the Industry.

What is perhaps the greatest optimistic note of 1915, is the confidence that the public is placing in the automobile industry, i. e., speaking from the financial standpoint as well as that of buying. The automobile consolidations that have been formed are paying large dividends and are firmly intrenched in the financial world, having the highest standing and best of rating. An analysis of the terms and conditions underlying the securities bring forth some interesting results, and such that cause investors to give every consideration to these investments.

Without a doubt the greatest example of industrial honesty in the history of the world is



The Present Plant of the Winton Motor Car Company, Cleveland, O.

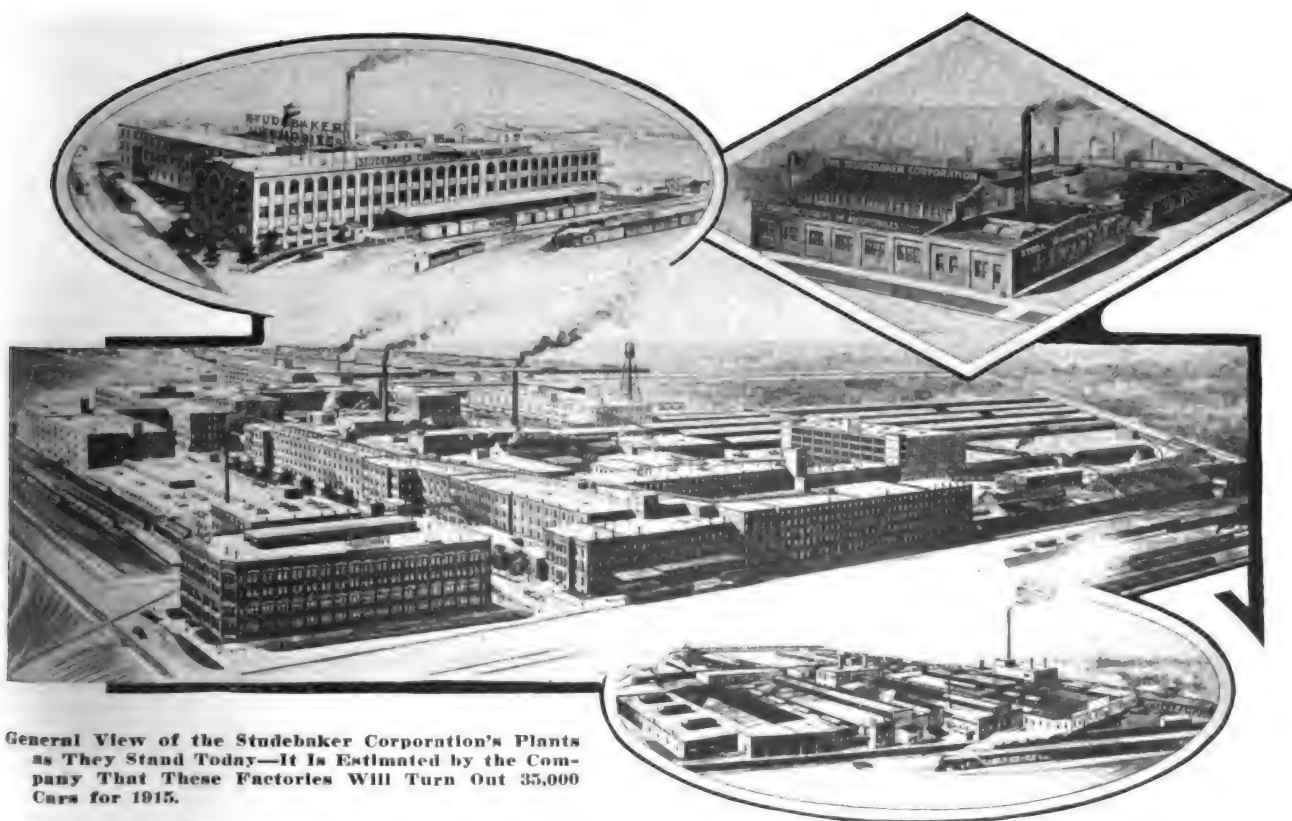


General View of the Model White Company Plant at Cleveland, O., All One-Story Glass Roofed Buildings.

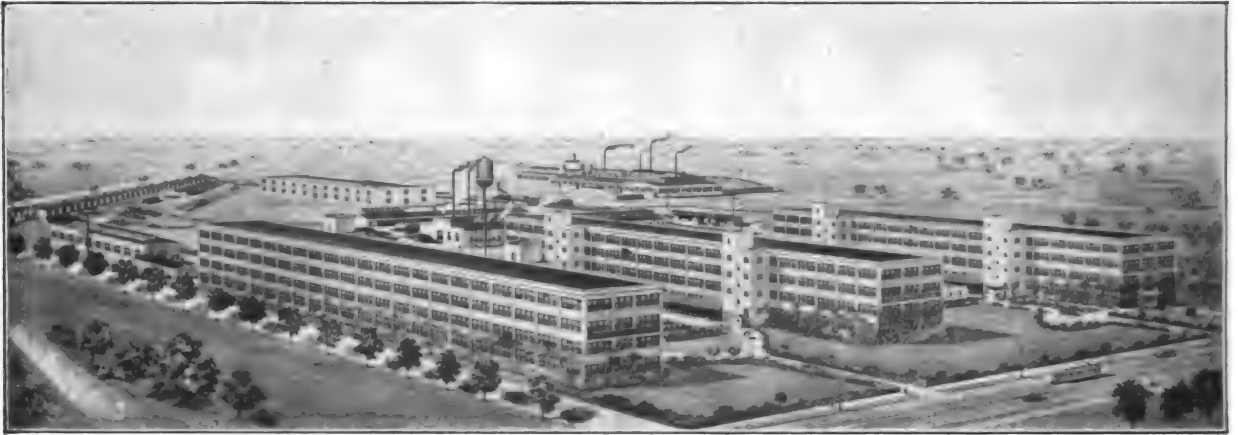
being set by the Ford Motor Company, Detroit, Mich. Giving a dollar-for-dollar value, and maintaining working conditions that was a dream of Bellamy 25 years ago, the eyes of the whole world are focussed on Henry Ford. Starting June 16, 1903, with \$100,000 capital, 311 employees, a factory space of a trifle over a quarter of an acre, and an output of 1708 cars for the first year, the Ford Company has climbed to dizzy heights. But throughout the years of wonderful production, this concern has shunned over-capitalization and today it holds a place in the financial world that undoubtedly has never been

equalled by any other company in any industry.

With a total capitalization of \$2,000,000, it earned a gross of between \$80,000,000 and \$90,000,000 last year, of which \$25,000,000 was surplus. The company's output for 1915 will be in excess of 300,000 cars, and the present capacity of the plant is approximately 2000 cars a day, or 600,000 a year. The Ford factory, Ford, Ont., Canada, has a capacity of 35,000 cars annually. This company is capitalized at \$1,000,000 and its stock is quoted at \$450 a share. The Ford plant at Manchester, England, contributes another 15,-



General View of the Studebaker Corporation's Plants as They Stand Today—It Is Estimated by the Company That These Factories Will Turn Out 35,000 Cars for 1915.



The Chalmers Motor Car Company Plant, Another Progressive Concern That Is Located In Detroit.

000 cars to the annual output. Mr. Ford pays a minimum wage of \$5 a day and divides \$10,000,000 annually among his employees, "not in the sense of a gift, but because they earn it".

General Motors a Big Success.

With earnings of \$170,977,223 for the past two years, the General Motors Company, New York City, may be termed a huge success in every respect. For 1913 its gross was \$85,603,920, and for 1914 it showed a total earning capacity of \$85,373,303. The decrease was due, of course, to the general disturbed financial conditions, but despite this the company increased its working capital over \$1,000,000, having \$24,331,333 for this purpose.

By way of explanation it should be pointed out that the General Motors is a holding company, having acquired the entire capital stock of a number of leading automobile, truck and motor manufacturing concerns. Formed for this

purpose, the company secured control of the following concerns: Buick Motor Company, Cadillac Motor Car Company, Oakland Motor Car Company, Olds Motor Works, Cartecar Company, Elmore Manufacturing Company, Northway Motor and Manufacturing Company, Peninsular Motor Company, Randolph Motor Car Company, Rapid Motor Vehicle Company, Reliance Motor Truck Company, Welch Motor Car Company, Champion Ignition Company, Jackson-Church-Wilcox Company, Michigan Auto Parts Company, Michigan Motor Castings Company, Oak Park Power Company, McLaughlin Motor Car Company, Ltd., Weston-Mott Company, General Motors Truck Company, General Motors Export Company, General Motors (Europe), Ltd., and General Motors Company of Michigan. The total preferred stock of the above companies is \$646,000, of which the General Motors acquired \$596,000, and of the \$15,926,003 common stock,



Aeroplane View of the Detroit Plant of the Hupp Motor Car Company.

the holding company owns \$15,398,003. As a dividend payer the General Motors has an excellent record, maintaining a steady rate of seven per cent. on its own \$18,038,400 outstanding preferred stock. A stock dividend of 150 per cent. was paid on the common stock November, 1909.

Overland to Turn Out 75,000 Cars.

For 1915 the Willys-Overland Company, Toledo, O., will have an output of 75,000 automobiles, making the greatest showing in the history of the firm. With a capitalization of \$30,000,000, a total of 8600 men employed, 92 acres of ground for factories, and an actual floor space of 79 acres, the Willys-Overland occupies an enviable position in the automobile world. The company's growth is well illustrated in the following tabulation,



tion, which gives its production output from the first year to date:

Year	Output	Year	Output
1908	400	1912	22,500
1909	4,000	1913	40,000
1910	12,500	1914	50,000
1911	16,000	1915	75,000

The Willys-Overland is a striking example of the manner in which the modern automobile company is being financed. The fundamental principles behind this concern's financing are of an exceptionally strong character. The \$5,000,000 outstanding seven per cent. cumulative preferred stock is preferred as to both assets and profits, and is redeemable as a whole or in part at the option of the company at 110 and accrued dividends on 60 days notice. A cumulative sinking fund for the purchase or redemption of the preferred stock at not exceeding 110 and accrued dividends has been created, and on July 31, 1914, \$250,000 was set aside for this purpose. On the same date this year another \$250,000 will be retired, and beginning July 31, 1916, the annual sinking fund will be an amount equal to 10 per cent. of the net earnings for the preceding fiscal

year, which must not be less than \$250,000. Through the ownership of the entire \$1,500,000 stock, the Willys-Overland has owned the Garford Company, but late reports state that this concern's holdings have been disposed of.

Studebaker Rushing Train Load Shipments.

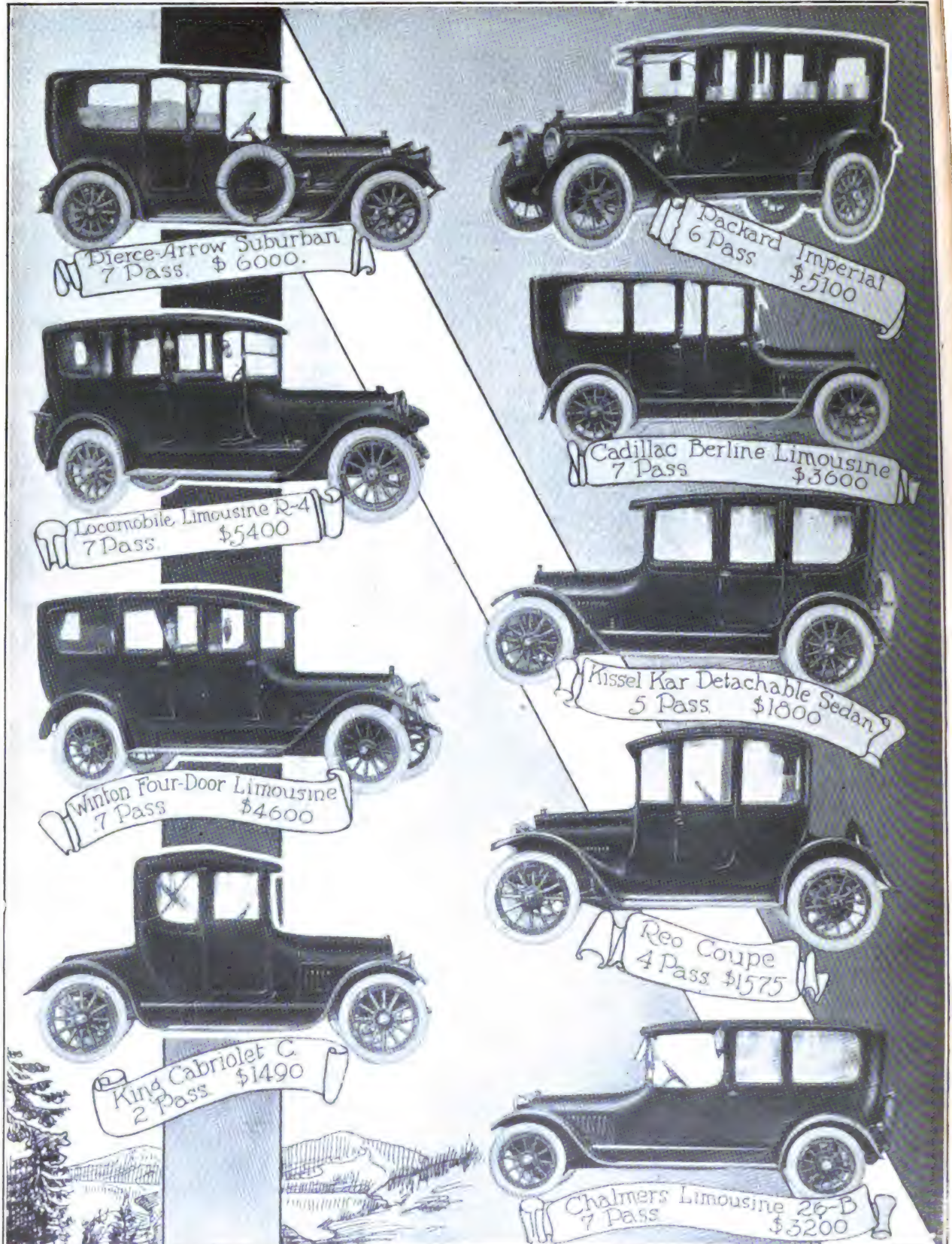
An excellent indication of the coming period of prosperity due to bumper crops is well illustrated by the action of the Studebaker Corporation, Detroit, Mich., in rushing a train load of Studebakers to its Kansas City branch for distribution throughout Kansas and Oklahoma. This is the first time in the history of the Studebaker Corporation that a train load of cars has been shipped to the Middle West during the production season, but the demands of the farmers throughout that section made such action necessary. During the past year this concern manufactured 17,600 fours and 7000 sixes, and \$160,000 expended during the year for plant additions will enable the corporation to turn out 35,000 cars for the present year.

The earning statement of the past year will not be made pub-



In the Upper Photograph the Factory Where the First Pierce-Arrow Cars Were Constructed Is Shown, and in the Lower Picture the Present Plant of That Company Is to be Seen.

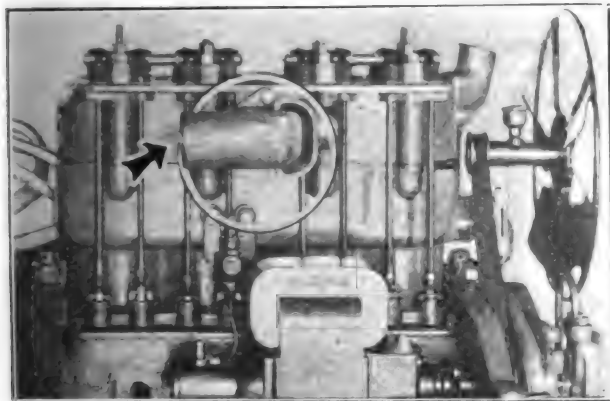
lic until the Studebaker Corporation holds its annual meeting, April 6, but it is known that the company year was the most successful since its inception. The current year will be a banner period and the record of 1914 will be far surpassed. Studebaker is paying full dividends on its outstanding \$12,180,000 seven per cent. preferred, and a special surplus account of not less than three per cent. of the preferred outstanding is set aside each year for redemption of the preferred, and that fund must amount to \$1,000,000 before any dividends are paid on the common, and not more than six per cent. to be paid on common until this fund totals \$2,500,000.



CARBURETION IMPROVED—FUEL GAUGES POPULAR.

Use of the Heat of the Exhaust More Prevalent Than Formerly, and Carburetors Are More Accessible for Adjustment and Cleaning—Fuel Gauges Illuminated.

VISITORS to the Boston show will find many interesting constructional details in the 1915 models, particularly in the effort of the



The Chevrolet Motor Has Its Hot Air Horn Cast Integral with the Exhaust Flange.

manufacturer to obtain the maximum mileage a gallon of fuel from his motor. In this respect the carburetor designer can be said to have co-operated by incorporating in his product means for regulating the proportions of fuel and air from the seat.

Those motorists who derive considerable enjoyment from inspecting the latest offerings in carburetors and their attachments will be afforded ample opportunity at the coming exhibition, for several new designs will be shown.

While the utilization of the heat given off by the exhaust manifold or pipe has been in vogue for some time, and is generally employed, for assisting in the vaporization of the fuel, a new application is noted in the Chevrolet motor shown in an accompanying illustration.

This engine is cast en bloc and has a detachable or removable cylinder head. Cast integrally with the head is the exhaust pipe elbow, which is secured to the block by a flange. The elbow is provided with an opening or recess, permitting the entrance of air to the pocket, whence it is drawn by the suction of the piston through a flexible pipe attached to the opening indicated by the arrow in the illustration.

A feature of the 1915 fuel systems is the placing of the carburetor in a position making for convenience as well as accessibility. It is now possible to adjust the proportions of fuel and

air without stooping or reaching into the pan.

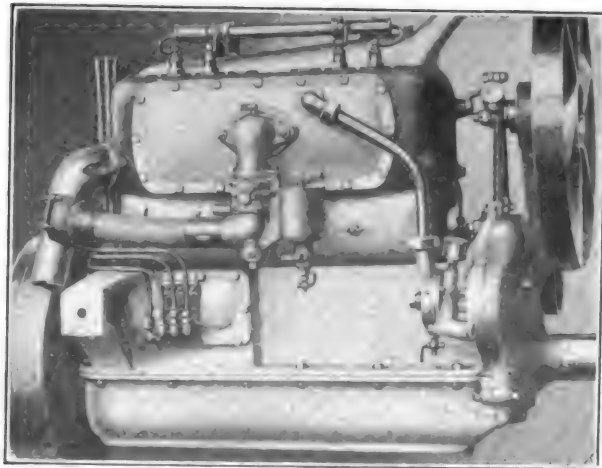
An example of accessibility is noted in the White. Not only is the carburetor easily reached, but it is in close proximity to the large water jacket, as may be noted by the accompanying illustration. Another feature, a practise that is becoming more prevalent, is the elimination of the long intake manifold.

The maker of the White car, as does many other manufacturers, employs the heat of the exhaust, and in the former design the flexible pipe is very short and free from bends. Connection with the exhaust pipe is by a stove, and provision is made for regulating the quantity of outside air admitted.

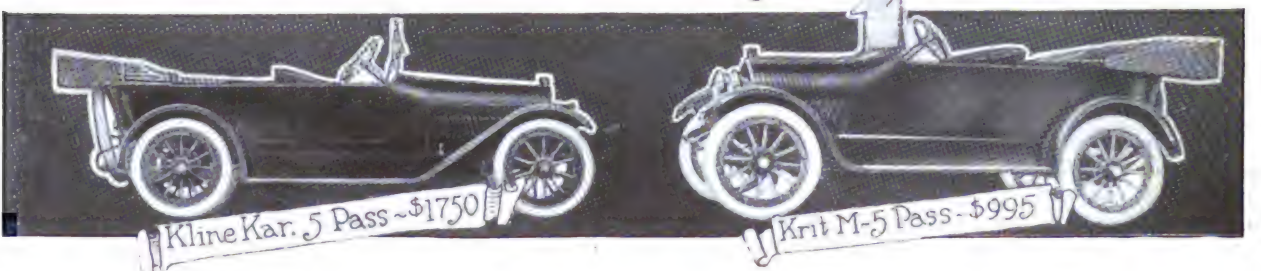
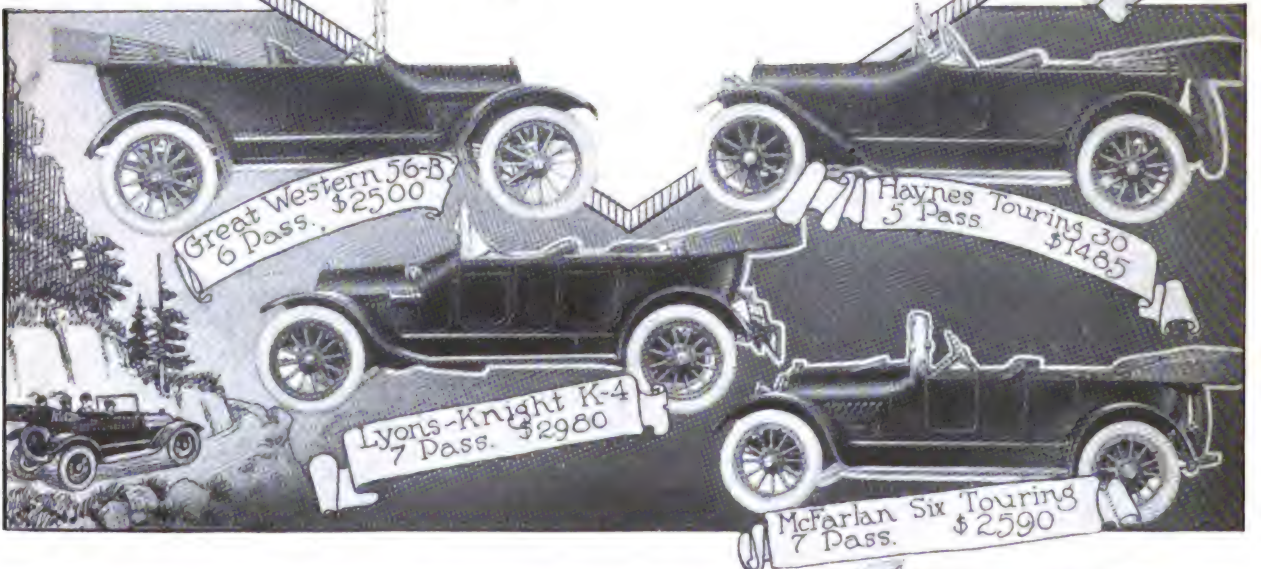
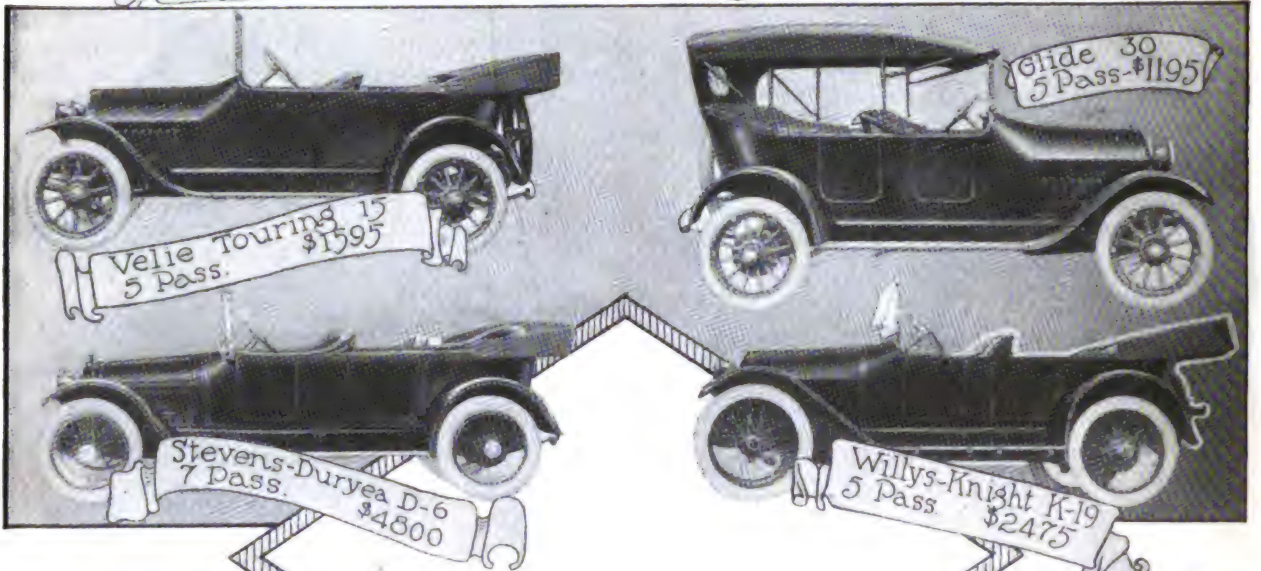
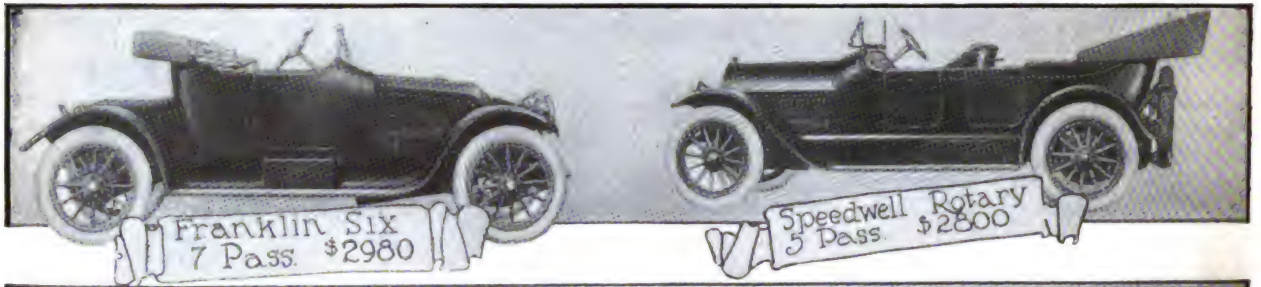
Another innovation, not entirely new, however, is water jacketing the intake manifold. This construction maintains the temperature of the walls of the pipe at a point where it is held the greatest difficulty is experienced in preventing the deposition of particles of fuel on the walls, especially before the motor becomes warm.

The absence of the reserve fuel tank is noticeable. In place of it is the dash gauge, which indicates the supply on hand, and several manufacturers provide for illumination of the gauge at night, placing a small electric lamp in close proximity.

Relative to the fuel supply, an increasing use of the vacuum feed will be noticed at the Boston show. Pressure feed is largely employed.



Illustrating the White Method of Utilizing the Heat of the Exhaust to Assist in the Vaporization of the Fuel—Note the Compactness of the Intake Pipe.



BODY REFINEMENTS—IMPROVED SPRINGS.

Wider Doors Making for Easy Exit and Entrance to Front Seats and Tonneau—Springs Are More Carefully Constructed, Providing Maximum of Comfort.

THAT the body designer has given consideration to the convenience of the driver of the 1915 motor vehicle is noted in the use of staggered front seats. This obtains not only in the open types, but with the enclosed forms. The placing of the driver's seat ahead of that of the other passenger, as noted in the illustration showing the arrangement of the Scripps-Booth, gives the operator ample room to



Accessibility of Seats in Scripps-Booth.

rotate the steering wheel without annoying the other passenger.

More attention is being given to affording easy exit and entrance to both the front and rear compartments of the body. The doors are wider, and in several instances the gearshift and emergency levers are so located that they do not obstruct the entrance to either seat. Some makers are placing the control levers between the seats near the heel board, while others carry them well forward, as noted in the Scripps-Booth, for example.

Both the front and rear compartments of the touring body are roomier than formerly, and divided seats are coming into vogue. Another design that is gaining many adherents is the body providing an aisle between the front seats. This enables an occupant of the front seat to pass to the tonneau, or vice versa, without stopping the car or leaving the body, and similarly drivers may be changed.

Among the refinements appearing on high-grade cars are electric lamps for illuminating the running board and entrance to the tonneau. These lamps are so wired that the circuit is closed when the door is opened, and upon closing the door the lights are extinguished.

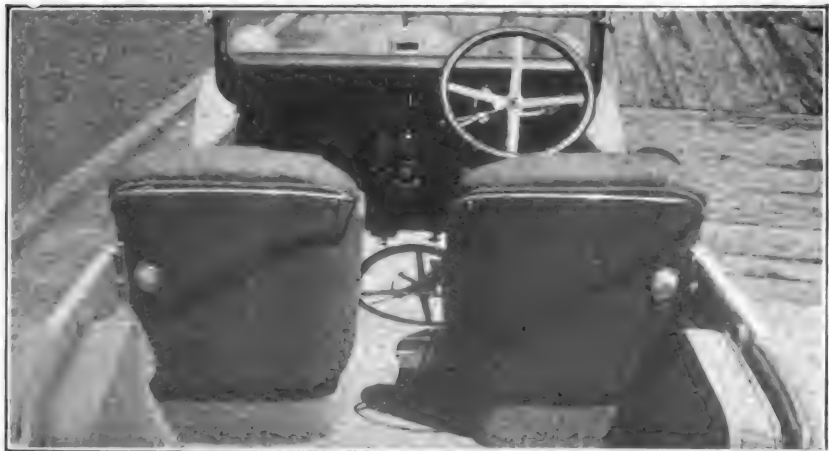
An example of tonneau lamps is noted in the Pierce-Arrow body shown in an accompanying illustration. As may be noted, the lights are located in the backs of the front seats, where they direct the rays in such manner that the running boards and entrance to body are well illuminated.



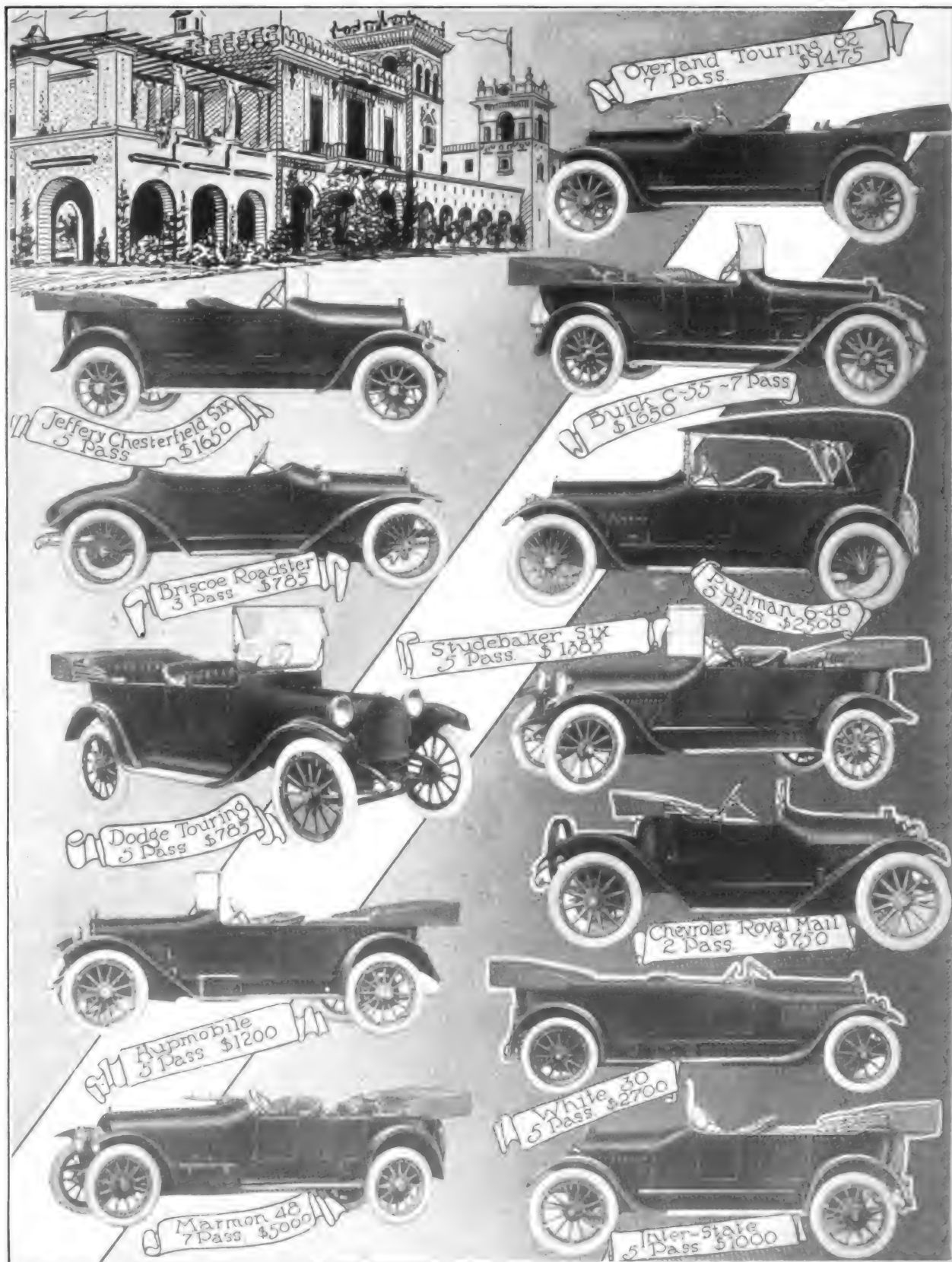
Spring Retention of the White Car.

The spring designer now offers constructions that may be said to be perfection. Not only is the metal employed the best that can be obtained, but the tempering is carefully carried out and in a scientific manner. As a result the springs retain their shape and elasticity.

The three-quarter elliptic springs are largely favored by the maker of the 1915 model, but the cantilever forms have made remarkable gains since last year. As a result the majority of the cars take the drive through the springs.



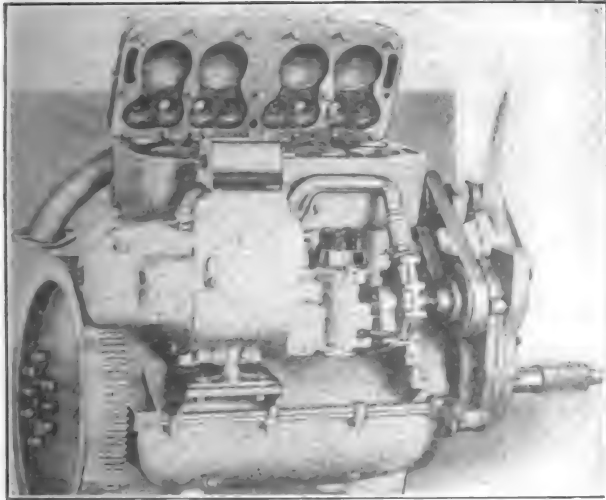
Showing the Aisle Between the Front Seats of the Pierce-Arrow and the Lamps for Illuminating the Running Board and Entrance to Tonneau.



MOTORS ACCESSIBLE—MECHANICAL DETAILS.

Detachable Cylinder Head Gaining Many Adherents Among Makers of Motor Cast En Bloc—Refinements and Conveniences Appealing to the Motorist.

THE motorist who maintains his own car; that is, makes adjustments, etc., will find that in many respects the power plant of the 1915 motor



The Detachable Cylinder Head, a Design That Affords Easy Access to the Pistons, Valves, Etc.

is more easily cared for than the motor of several years ago. This is particularly true of the cylinders, for several makers have joined the ranks of those building an en bloc type motor with a detachable cylinder head.

With such a construction it is a simple matter to loosen the locking nuts or bolts and detach the cylinder head, affording access to the piston heads and combustion chambers. The work of grinding in the valves is greatly facilitated by the design in that there are no valve plugs to displace or freeze. Another advantage of the detachable cylinder head is that access is afforded to the water jackets, making it a simple matter to remove any deposits or scale that may accumulate through the use of too hard a water.

Torque tubes are utilized by a number of manufacturers and the front end of the tube is generally forked and of sturdy construction, as may be noted in

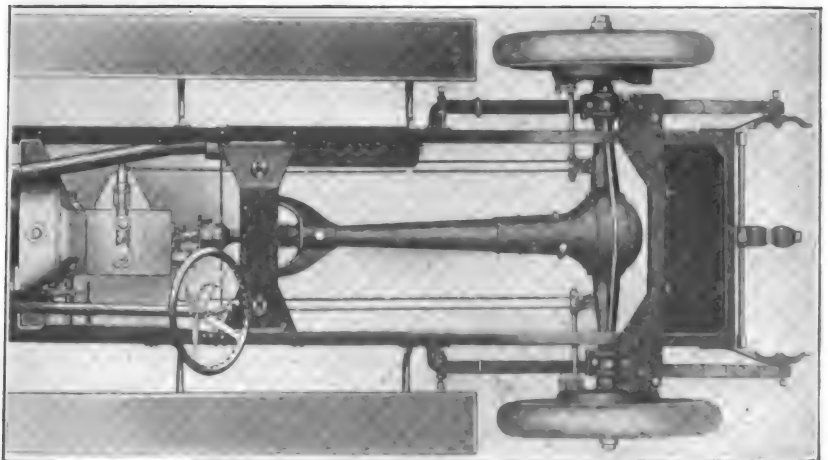
the accompanying illustration depicting the torque tube of the Pathfinder.

The accessibility of the parts requiring lubrication and attention is pronounced, and many minor mechanical refinements lighten labors. For example: The placing of the jack under the axle is not always easy with the tire deflated. The new Speedwell solves the problem by incorporating an extension with the brake drum which permits of fitting the head of the lifting jack without stooping under the axle.

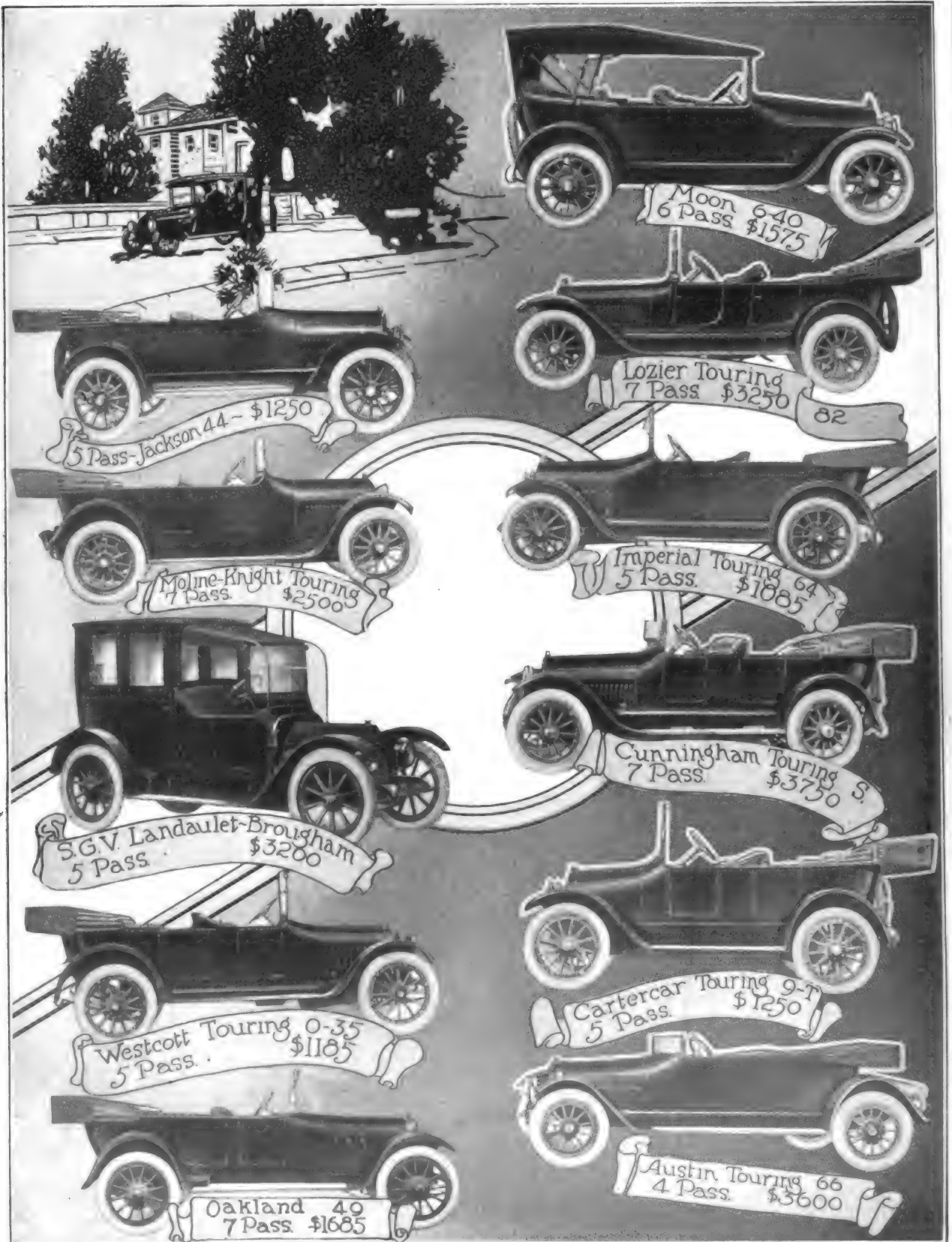
An innovation that will appeal to the owner when lifting the hood is the device employed by the maker of the Dodge car. Generally one is obliged to hold the hood up with one hand with the tapered bonnet and cowl dash, as the hood is likely to scratch the finish. Notches in the hood supports in the Dodge car retain the uplifted hood in position, preventing it falling upon one's head.

Those who have operated a machine over rough roads will appreciate the innovation employed on the National cars. A depression is made in the floor boards in which the foot rests, a convenience when utilizing the accelerator. This not only prevents wear of the covering of the board, but avoids the possibility of accidental acceleration of the motor.

Among the conveniences noted in the new cars is the provision for the storing of tools, many makers placing small lockers or compartments in the body for this purpose.



The Torque Tube of the Pathfinder Terminates in a Forked End and Is Well Anchored.



IGNITION IMPROVED—MAGNETOS REFINED.

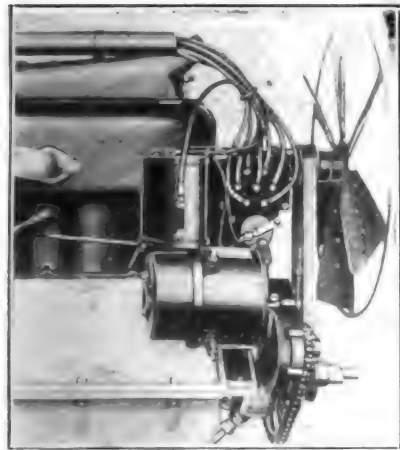
True High-Tension Magneto Generally Favored; and Suspension of Cables Prevents Short Circuits—Battery Ignition Steadily Growing in Favor.

A REVIEW of the ignition systems for 1915 shows that the true high-tension magneto is generally favored, and that the use of an auxiliary source of current supply has lost ground. With the perfection of the motor starter and the storage battery, there is practically no need of dual ignition, although it will be found on several cars.

The 1915 magneto is an improvement over earlier types in that it is now constructed to be weather proof, impervious to water and road dust. In place of the metal coupling will be found many ingenious flexible and adjustable couplings, which have the advantage of being noiseless. With many of these couplings it is possible to make a much finer adjustment or

more accurate timing than is possible with the solid couplings. With the last-named type the usual method is to shift a gear, advancing or retarding it a tooth or more.

The visitor to the show will notice that a number of makers have adopted the



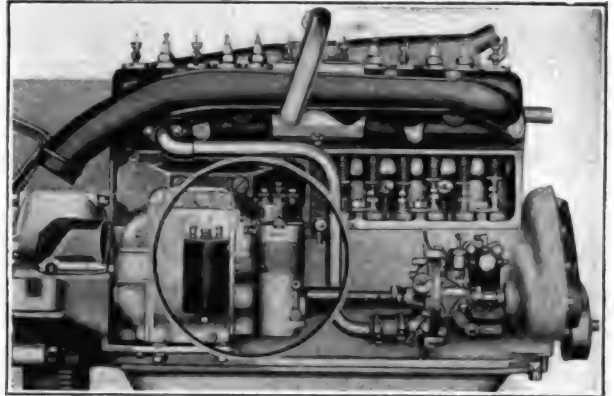
Location of Magneto on Studebaker.

storage battery as a source of current supply, employing a combined timer and distributor, especially the popular-priced machines. In several instances the automatic spark control is utilized, relieving the driver of the work of manually advancing or retarding the spark, and the automatic type is especially noticeable with the high-speed motors.

Generally the timer-distributor is a unit with the lighting generator, as shown in an accompanying illustration. The distributor and coil employed for intensifying the low-tension current are, as a rule, very accessible, and well protected.

A departure from conventional practise in the mounting and drive of the timer-distributor is

noted in the Chalmers motor, shown in an accompanying illustration. The unit is placed on the top of the detachable cylinder head and is



Showing the Location of the Distributor and Coil on the Lighting Generator, a Method Very Generally Favored by Makers Using the Battery Current for Ignition.

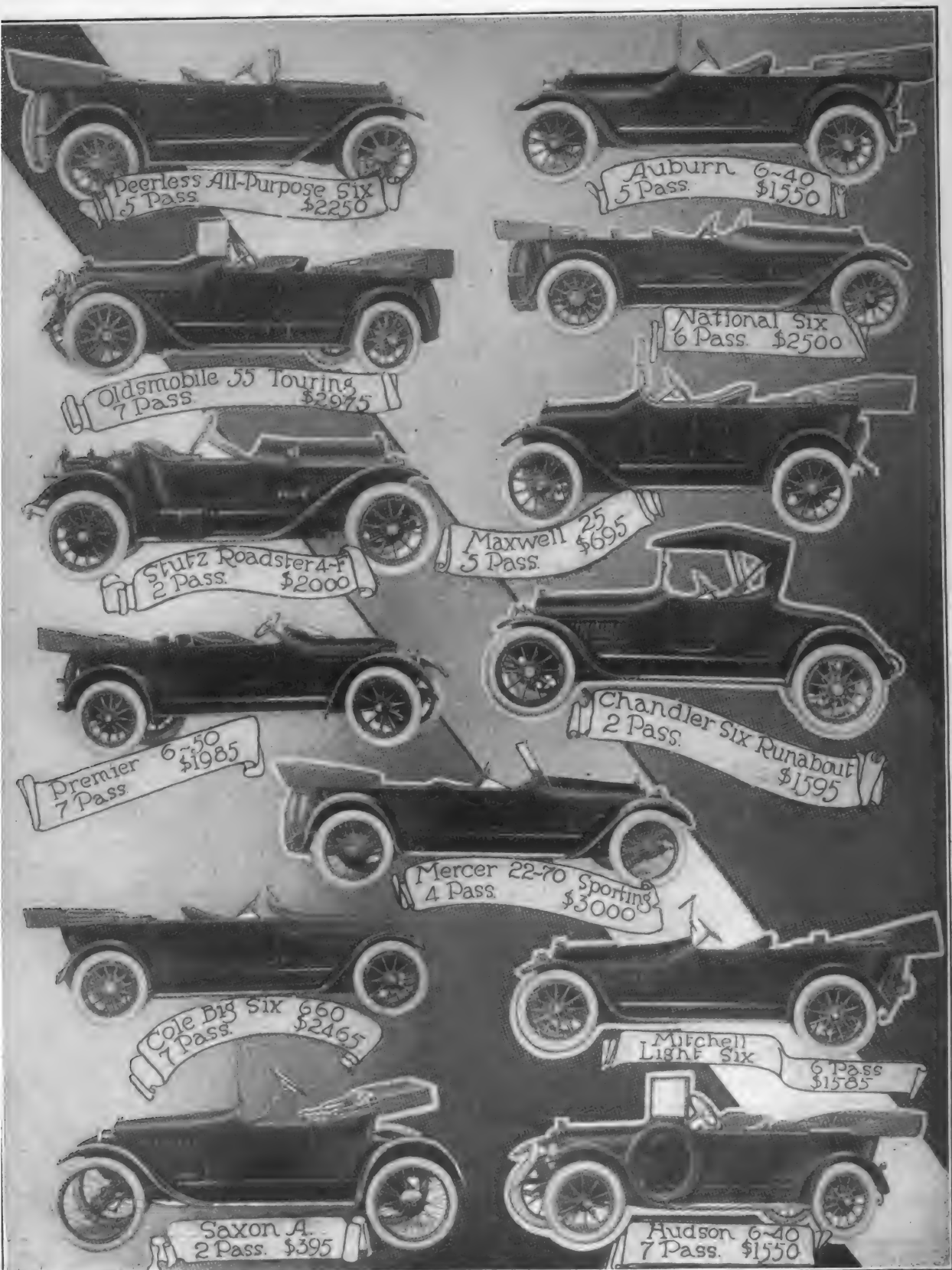
shaft driven. The bell crank of the linkage actuating the distributor is attached to the cylinder head.

Considerable attention has been paid to the suspension of the ignition cables to avoid the possibility of chafing and short circuits. With the very general adoption of the true high-tension magneto the wiring is greatly simplified, there being but one lead in addition to those connecting the distributor with the spark plugs. Some magnetos are mounted in front of the motor.



The Unusual Location of the Timer-Distributor on the Chalmers Motor.

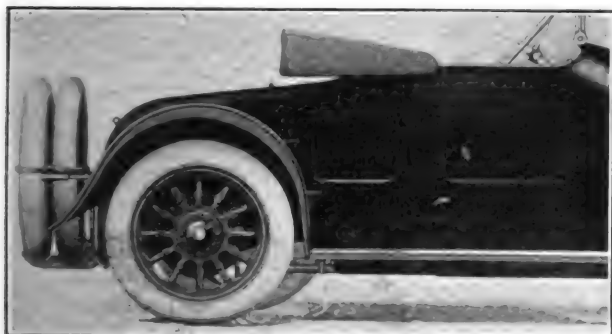
THE AUTOMOBILE JOURNAL.



GROUP CONTROL UNITS—BETTER TIRE IRONS.

Lighting and Ignition Switches, Gauges, Etc., Are Conveniently Grouped—Tire Holders Are Stronger and More Rigidly Secured, Preventing Chafing of the Shoes.

WITH the adoption of electric lighting and motor starting the number of control units has been augmented. Generally the con-



The Tire Irons Are Now More Substantially Made and Securely Anchored to Prevent Chafing of the Shoes.

trol members are mounted on the instrument board, although some makers have departed from this practise in an endeavor to obtain a clean dash.

At first glance many of the dash boards of the 1915 model will appear overburdened with control units. Generally the equipment comprises the lighting and ignition switches, fuel gauge, clock, speedometer, oil sight feed, fuel filler cap (when cowl tanks are utilized), ammeter and volt meter, etc. To these may be added the miniature lamps employed to illuminate the clock, speedometer, fuel gauge and oil indicator.

The maker of the Studebaker six has departed from conventional practise in respect to the location of the control units and places the lighting and ignition switches on the heel board of the front seat just below the cushion, a location convenient to the driver's right hand. The different groups are controlled by push and pull buttons, and the ignition and lighting groups are sufficiently separated to avoid the possibility of error in their operation. The arrangement of the junction panel makes it possible to remove the body from the chassis without disturbing a large number of

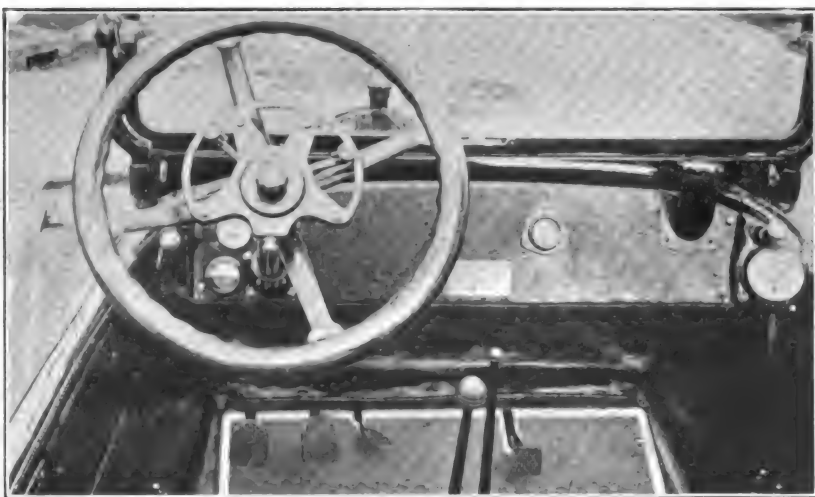
connections making for convenience.

The Locomobile small four is another car in which the various connections of the switchboard are very accessible. The board is hinged, and dropping down as it does when the locking device is released, affords easy access to all connections. All of the electrical push buttons are now placed in a vertical row in the instrument board, and the starter button is located at the lower extremity of the board, being operated by the foot.

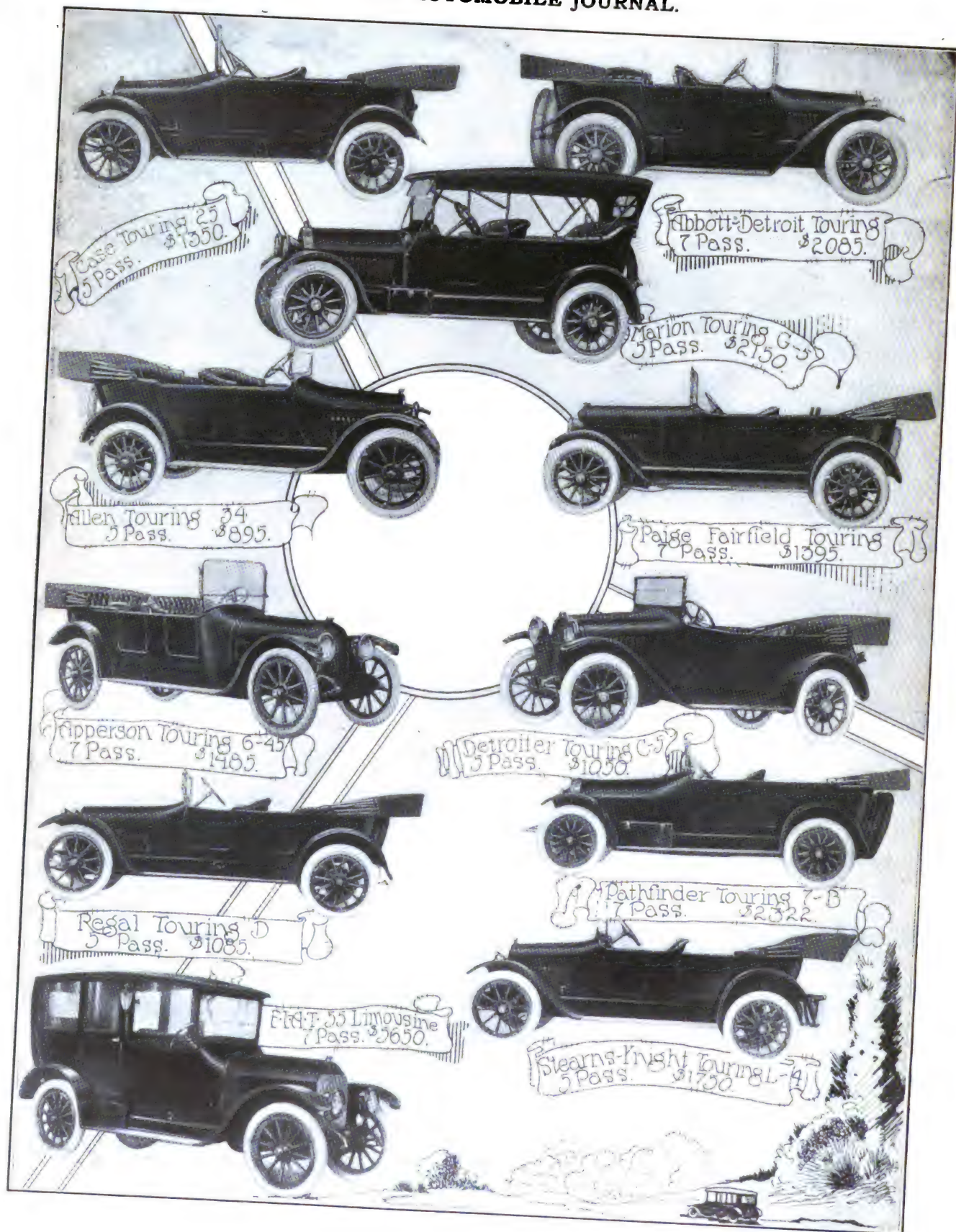
Another example of compact grouping of the control and indicating units is noted in the Pierce-Arrow, illustrated elsewhere in this issue. All of the switches, gauges, etc., are placed in the centre of the instrument board, very convenient to the driver.

An inspection of the 1915 models will reveal the tendency of the manufacturer to centralize the control members. Many makers now place the push button operating the electric horn on the top of the steering column, a position making for convenience. Many times the driver does not have sufficient time to reach under the wheel to operate the button, and its location on the top of the column also permits of keeping both hands on the wheel.

An improvement in the design of spare tire carriers is noted. As a rule the tire irons are placed at the rear of the chassis.



Illustrating the Instrument Board of the Stearns-Knight Car—The Ignition and Lighting Switches Are on the Heel Board of the Front Seat.



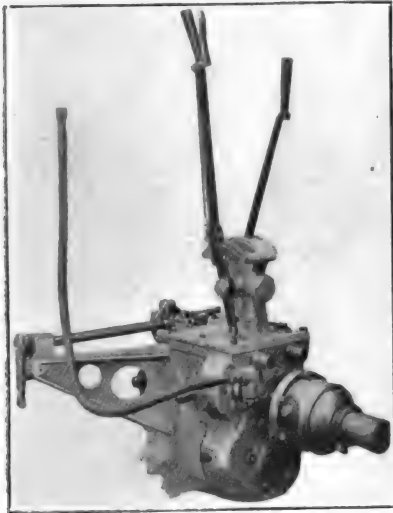
POWER TIRE PUMPS—SPEEDOMETER DRIVES.

Many Novel Installations and Drives Noted in the Application of the Power Tire Pump
—Speedometers Now Driven from Gear on the Propeller Shaft.

A WIDE variety of positions for the power tire pump is noted in the new models. The power tire pump may now be considered standard equipment and will be found even on the popular-priced cars. A review of the different mountings will be of interest.

Generally the pump is placed well forward on the side of the motor and when in service is driven by a gear mounted on the water pump, magneto or lighting generator shaft. The National car utilizes the water pump shaft method, the driving gear rotating at all times and with it is meshed the pump gear.

The Willys-Knight employs a four-cylinder pump, mounting it over the water pump, and driving it by a gear on the water pump shaft with an idler interposed. The Mitchell utilizes a novel arrangement in that the pump is located in front of the distributor and is driven by a special shaft direct from the timing gears.



Speedometer Drive of the Dort.

The location and method of drive of the tire pump on the Pierce-Arrow is ingenious, in that it economizes space on the power plant and does not require the lifting of the hood to throw the pump into action. The pump is located on an extension of the gearset, from which it is driven by a secondary or layshaft. The lever, actuating a claw clutch, which places the pump in service, is connected with a rod or control member conveniently located in the front compartment of the body. On the Winton and Oakland the pump is carried on an extension of the timing gear case and driven by a gear on a layshaft.

The endeavor to obtain a clean appearing chassis, has resulted in the taking of the drive for the speedometer other than from the hub of the front wheel, a location generally requiring

a long shaft and one that exposes the gear to the abrasive action of road dust.

The Dort takes the drive from a special in-

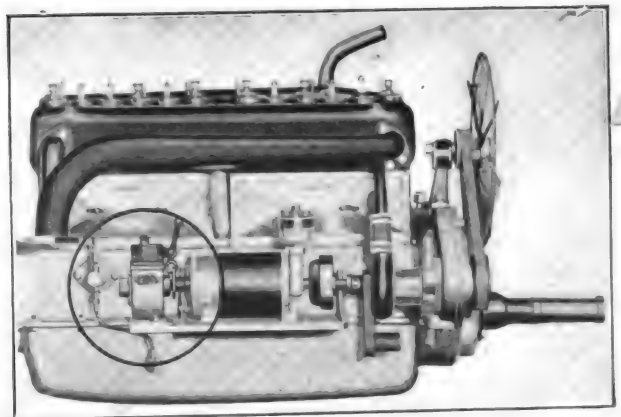


A Phantom View of the Dash Fuel Tank and Connections to the Carburetor of the Studebaker Car.

closed gear attached to the propeller shaft at the rear of the transmission, an installation making for quiet operation and one preventing tampering with the operation of the speedometer.

The National mounts a gear on the drive shaft and the pinion of the speedometer shaft is hung from the cross frame member. The Dodge car is another example of enclosing the driving gear in the gear box of the car. The Kissel-Kar drive of the speedometer pinion is by a gear located on the forward universal joint. A similar arrangement is employed on the Velie.

Relative to the location of the speedometer proper, it is now placed where it may be read easily and quickly by the driver.



Showing the Location of the Power Tire Pump on the Haynes Motor and How It Is Placed in Operation.

Woods Dual Control 1501
5 Pass. \$3100

Rauch & Lang Coach
5 Pass. \$3200

Baker D.A. Coupe
4 Pass. \$2800

American Broc Double Drive 36
5 Pass. \$2950

Waverly Chair Brougham 109
4 Pass. \$2750

American-Borland 50
4 Pass. \$2250

Detroit Rear Seat Brougham
5 Pass. \$2950

Ohio Brougham 41
4 Pass. \$2900

LUBRICATION METHODS—BRAKE ADJUSTMENTS.

Many Novel Means Employed for Lubricating Clutch Collar, Yokes, Torque Tube Connections, Etc.—Brakes Now Easily Adjusted by Simple Mechanism.

A FACTOR that is responsible for the durability and efficiency of the modern car is the provision made by the manufacturer for the proper lubrication of many components formerly attended to in the assembly or overhaul. This is particularly true of such parts as the clutch collar or yoke, torque tube yoke connections, etc.

A close inspection of the various lubricating devices shows that grease cups are very generously employed about the chassis and that as a rule they are accessible. Among the installations are noticed the placing of a grease cup on the shaft bearing at the rear of the Fiat motor and the company also employs cups on the torque tube yoke connections.



Control Levers of the Marmon.

point to be lubricated is by a flexible tubing.

The Studebaker utilizes a flexible tubing for conveying grease from a cup located on the gear-set quadrant to the clutch collar. The Dodge employs a similar arrangement for lubricating the clutch collar, but unlike other designs the lubricant may be forced to the bearing without lifting the floor board. Located on the toe board of the Dodge car is a grease cup which is connected with the clutch collar by means of a flexible tube.

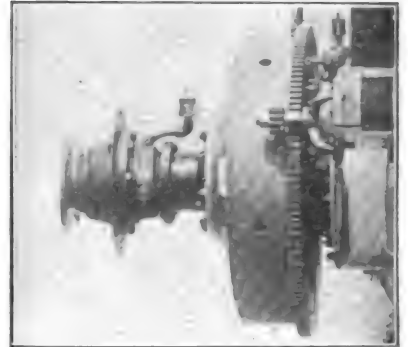
To make easy the correct adjustment of the brakes, the manufacturer has incorporated many ingenious devices in his product. After considerable wear the brake pedal must be moved to its maximum to obtain the desired efficiency, and

several makers provide means for taking up the lost motion.

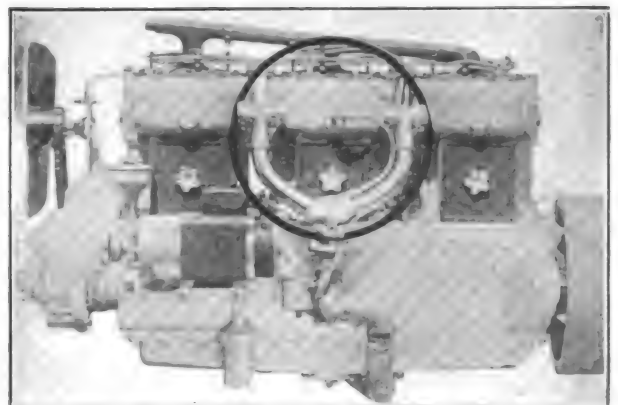
The National employs a turnbuckle arrangement by means of which the rods may be varied as to length, and a simple method of adjusting the brake bands is also included in the system. The Franklin, which employs a brake on the transmission shaft, is adjusted by a thumb screw, while the Dodge car has a wing nut for adjusting the brakes proper.

The Oakland car has an unconventional brake arrangement in that, instead of the usual yoke and pin, a knife edge bearing is provided at the connection of the pedal or lever end. It is similar to the arrangement of scales, and its advantage is stated to be that instead of wear obtaining play, continued use provides a better seat.

Adjustment is obtained by screwing up a winged nut on the threaded end of a rod which passes through a slot in the lower end of the brake pedal or lever and through a triangular block against which the end of the lever rests. The rod pivots in a flat forging.



Grease Cups on the Marmon.



Showing the Unconventional Method of Attaching the Intake Manifold to the Cylinders of the Marmon Motor.

Dudly B-1	2	385	—	B	2 3/4 x 4	12.10	95.0	P	T	G	Hol.	A. K.	D	S	2	1/2	100	28x3	R
Dispatch	2	850	5	900	L	30.00	220.9	P	T	G	Ray.	Bos.	D	FF	5	D	120	36x3 1/2	R
Detroit	2	*875	5	985	L	25.00	192.0	S	T	G	St.	West.	D	S	3	F	112	32x3 1/2	I
Dodge	2	785	5	785	L	35.00	212.0	SP	P	P	Stew.	Eisc.	C	S	3	F	110	32x3 1/2	L
G. W. Davis 38 A & B	2	1235	5	1235	L	22.50	213.6	SP	T	G	St.	West.	C	S	3	3/4	112	34x4	L
Dorris IA 4	2	2200	5	2200	I	43x5	300.7	SP	P	P	St.	West.	D	S	3	1/2	121	36x4 1/2	L
Empire 31-40	2	975	5	975	L	33x4 1/2	22.50	198.8	SP	T	G	Hol.	D	S	3	1/2	110	32x3 1/2	R
Fiat 55	2	4650	7	4650	L	5 7/8 x 6 1/2	42.00	567.3	P	P	Own	Remy	D	S	4	1/2	128	*36x4 1/2	R
Ford T	2	440	5	490	L	33x4	22.50	176.7	S	T	*	Own	D	PL	2	1/2	100	*30x3	L
Fal	2	1200	5	1200	L	4 1/4 x 5 1/2	28.90	312.0	C	P	Flet.	Remy	D	S	3	3/4	116	34x4	R
Fal Grayhound	2	2000	—	—	L	4 1/4 x 5 1/2	28.90	312.0	S	P	King.	—	D	S	3	3/4	114	34x4	R
Glide 30	2	1195	5	1195	L	3 1/2 x 5	19.60	192.5	S	T	Sch.	West.	D	S	3	F	114	32x4	L
Grant 21	2	425	—	—	L	2 3/4 x 4	12.10	95.0	S	T	May.	Bos.	C	P	2	3/4	90	28x3	L
Great Southern 50	2	1500	7	1750	L	*	43.05	507.2	C	P	St.	Bos.	C	S	3	1/2	128	36x4	R
Hall A	2	425	—	—	L	2 3/4 x 4	15.00	—	SP	T	May.	Sim.	D	S	2	1/2	100	28x3	L
Hercules 20	2	550	5	550	L	3 3/4 x 4 1/4	16.90	141.0	S	T	Hol.	St.	D	S	3	F	102	30x3	L
Hupp 32	2	1200	4	1200	L	3 3/4 x 5 1/2	16.90	182.5	P	T	Zen.	Bos.	D	S	3	F	106	33x4	R
Hupp K	2	1200	5	1200	—	3 3/4 x 5 1/2	18.20	197.0	P	T	Zen.	A. K.	D	S	3	F	119	34x4	L
Imperial 64	—	—	5	1085	L	3 3/4 x 5	22.50	—	C	T	St.	A. K.	D	S	3	F	115	32x3 1/2	L
Inter-State	—	—	—	1000	I	3 3/2 x 5	19.60	—	SP	T	—	Remy	C	S	3	F	110	33x4	L
Jeffery Four	2	*1525	5	1450	L	3 3/4 x 5 1/4	22.50	231.9	C	P	—	Bos.	C	S	4	F	116	34x4	L
Jackson Olympic	3	1375	5	1375	L	4 1/2 x 5 1/4	32.00	335.0	SP	P	Sch.	Remy	C	S	3	F	117	34x4	L
King C	2	1075	5	1075	L	*	—	243.5	SP	T	St.	A. K.	D	S	3	F	113	33x4	L
Knox 44	2	3300	5	3450	I	5 x 4 3/4	40.00	431.9	C	P	St.	Bos.	D	S	3	F	122	36x4 1/2	O
Knox 45	2	3500	7	3800	I	5 x 5 1/2	40.00	430.9	C	P	St.	Bos.	D	S	3	F	126 1/4	37x5	O
Kline 30	—	—	5	1685	L	5 x 4 5/8	25.60	232.5	C	P	St.	Bos.	C	S	4	F	115	34x4	R
Kline 40	2	1985	5	1985	T	*	29.71	335.9	C	T	St.	Bos.	C	S	4	F	120	36x4	L
Krit M	—	—	5	995	L	3 3/4 x 4	22.50	176.7	S	T	St.	Bos.	D	S	3	1/2	108	32x3 1/2	L
Krit O	2	850	5	850	L	3 3/4 x 4	22.50	176.7	S	T	John.	Remy	D	S	3	1/2	108	32x3 1/2	L
Kissel 36	2	1450	*5	1450	L	4 1/2 x 5 1/2	28.90	312.0	SP	P	St.	West.	C	S	3	F	121	34x4	L
Lambert 48-C	—	—	5	1200	L	3 3/4 x 5 1/4	22.50	231.9	SP	P	Sch.	Br.	—	F	—	1/2	112	32x3 1/2	L
Lambert 68-C	—	—	5	1395	L	4 1/2 x 5 1/4	27.30	280.6	SP	P	Sch.	Br.	—	F	—	1/2	115	34x3 3/4	R
Lambert 98-C	2	1395	—	—	L	4 1/4 x 5 1/2	28.90	280.6	SP	P	Sch.	Br.	—	F	—	1/2	112	34x3 3/4	R
Lenox Four	*2	2000	5	2000	L	4 1/4 x 5 1/2	40.00	—	P	P	Own	West.	C	—	3	3/4	118	34x4 1/2	L
Lexington 4-K	3	1375	5	1375	T	3 3/8 x 5 3/8	24.22	252.5	S	P	Sch.	West.	D	S	3	3/4	115	34x4	L
Lozier	2	2100	7	2100	L	4 1/4 x 6 1/2	28.90	354.6	C	P	Stew.	Bos.	D	S	4	F	120	36x4 1/2	L
Lyons-Knight K 4	2	2900	7	2900	L	4 1/2 x 5 1/2	32.40	349.9	P	P	St.	Sim.	D	S	3	F	130	37x5	L
Moline-Knight	2	2500	*5	2500	—	B	4 x 6	301.6	P	T	Sch.	Bos.	C	S	4	F	128	36x4 1/2	L
Morse D	2	3600	5	3600	I	S 4 9/8 x 5	34.25	336.0	S	P	St.	Eise.	D	S	4	9/4	127	36x4 1/2	R
Maxwell 25	2	670	5	695	L	3 3/8 x 4 1/2	20.25	185.8	SP	T	Zep.	Sim.	C	S	3	3/4	103	30x3 1/2	L
Motorette	2	550	4	550	L	3 3/8 x 4	16.00	122.0	P	T	—	Mea.	—	S	4	F	104	*30x3	L
Moon 4-38	3	1350	5	1350	L	3 3/4 x 5	22.50	—	C	T	St.	Del.	D	S	3	F	122	34x4	L
McIntyre 25	—	—	5	695	T	3 3/8 x 4 1/4	22.50	—	SP	T	Hol.	Bos.	D	S	4	1/2	106	30x3	L
Metz 22	2	495	—	—	L	3 3/4 x 4	22.50	176.7	S	T	A.W.T.	Bos.	—	F	—	D	96	30x3	L

Mitchell—Five-passenger touring, \$1250; 6-passenger, \$1500; ignition, distributor. Parlin-Palmer 26—Starter, \$75 extra; oversize tires optional, 28x3 1/2. Pullman, Jr.—Roadster, either 2 or 3-passenger. R. C. H.—Ward Leonard electric starter, \$100 extra. Remington—Roadster, tires 30x3. Stutz—Fuel feed, gravity on roadster; force on touring; wheelbase, 120 inches on roadster; 180 on touring. Simplex—Manufactures chassis only; bodies to order; Simplex 38—4 and 6-passenger cars, \$5600; 6 and 7, \$5700; Simplex 50—4 and 6-passenger cars, \$6100; 6 and 7, \$6200; Simplex 75—4 and 6-passenger, \$6850; rear tires on Simplex 38 and 50, 37x3; Simplex 75—Wheelbase, 124 or 137. Saxon—Special, design lighting and starting, Detroit Starter Co., \$70 extra. S. G. V.—\$3200 is without starter, which is \$100 extra. Trumbull—Carburetor, Breese Zephyr. Velle—6-passenger touring, \$1640; tire size on 6-passenger, 35x4 1/2. Vulcan—Ignition, Westinghouse or Elcomann.

SPECIFICATIONS OF 1915 FOUR-CYLINDER CARS.

Make and Model	Roadster		Touring	Cyl. Type.	How Cast	Bore and Stroke	S. A. E. H. P.	Displacement	Lubrication	Cooling	Fuel Feed	Carburetor	Ignition	Clutch	Transmission	Speeds	Rear Axle	Wheelbase	Tires	Lighting and Starting	Driver
	Seats	Price																			
Mitchell Four	2	1250	*5	—	P	4 x5½	35.00	276.4	C	P	V	Ray.	*	C	S	3	F	116	34x4	Apelco	L
Oakland 37	2	1150	5	1200	L	B 3½x5	19.60	192.4	SP	P	V	Mar.	Del.	C	S	3	F	112	33x4	Delco	L
Oldsmobile 42	2	1285	5	1285	I	B 3½x5	19.60	192.4	S	P	P	Mar.	Del.	C	S	3	¾	112	33x4	Delco	L
Overland 80	2	1050	5	1075	L	S 4½x4½	27.25	240.5	S	T	G	Sch.	Bos.	C	S	3	¾	114	34x4	Ow	L
Overland 81	2	795	5	850	L	S 4 x4½	25.60	226.0	S	T	G	Sch.	Sp.	C	S	3	¾	106	33x4	Ow	L
Partin-Palmer 20	2	*495	—	—	L	B 3½x4	15.60	123.7	SP	D	G	Muir.	A. K.	DP	S	3	F	96	*29x3	G. & D.	L
Paterson 4-32	—	—	5	1095	L	B 3½x5	19.60	192.4	SP	P	G	St.	Del.	C	S	3	F	112	33x4	Delco	L
Pilgrim 15	3	685	5	685	L	B 3¾x4½	22.50	188.0	SP	P	V	Sch.	Remy	DP	S	3	½	106	30x3½	Remy	L
Paige 4-36	3	1075	5	1075	L	B 4 x5	25.60	251.3	C	P	G	Stew.	Bos.	D	S	3	F	116	34x4	G. & D.	L
Peerless All Purpose	3	2000	5	2000	L	B 3¾x5	22.50	—	S	T	V	St.	A. K.	D	S	3	½	113	34x4	G. & D.	—
Pullman Jr.	*2	740	5	740	L	B 3¾x4½	22.50	—	SP	T	G	St.	Sp.	D	S	3	F	110	30x3½	Apple	L
Real	2	390	4	390	L	B 2¾x4	12.10	—	P	P	P	Opt.	A. K.	C	S	3	—	100	30x3½	Opt.	L
Reo the Fifth	2	1000	5	1050	L	P 4½x4½	27.25	240.5	S	P	G	Hol.	Remy	D	S	3	¾	115	34x4	Remy	L
Regal D and R	2	1085	5	1085	L	B 3¾x5	22.50	220.9	SP	T	—	Stew.	A. K.	C	S	3	¾	112	32x3½	Rush.	L
R-C-H	—	—	5	900	L	B 3¼x5	16.90	—	S	T	G	—	Bos.	C	S	3	F	110	32x3½	*Ward-L.	L
Remington	2	695	4	695	L	B 3½x4	15.60	201.0	S	T	G	—	A. K.	C	S	3	¾	106	*30x3½	Disco	L
Studebaker	3	985	5	985	L	B 3½x5	19.60	192.4	SP	P	G	Sch.	Remy	C	S	3	F	108	33x4	Wagner	L
Scripps-Booth	3	775	—	—	I	B 2½x4	13.25	—	CP	P	G	Zen.	A. K.	C	S	3	F	110	30x3½	Bijur	L
Stutz	2	2000	6	2275	T	P 4¾x5½	38.40	376.9	P	P	*G	St.	Bos.	C	—	3	—	*120	34x4½	Remy	R
Sphinx A-15	—	—	5	695	L	B 3¾x5	18.60	180.0	S	T	G	Muir.	Sp.	C	S	3	½	112	30x3½	Apple	L
Simplex 38	*	*	*	*	T	P 4½x6½	38.00	485.3	SP	P	P	New.	Bos.	D	S	4	½	137	*36x4½	Rush	R
Simplex 50	*	*	*	*	T	P 5¾x6½	46.00	590.0	SP	P	P	New.	Bos.	D	S	4	O	137	*36x4½	Rush	R
Simplex 75	*	*	*	*	T	P 5¾x6½	46.00	590.0	SP	P	P	New.	Bos.	D	S	4	O	*124	35x5	Rush	R
Saxon	2	395	—	—	L	B 2½x4	11.00	180.2	SP	T	G	Mayer	A. K.	D	P	2	½	96	28x3	*	L
S. G. V. J.	2	*3200	5	*3200	L	B 3¾x4½	22.50	205.0	P	P	P	Zen.	Bos.	D	S	4	½	118	34x4	Ward-L.	L
S. G. V. F.	2	3500	5	3500	L	B 3¾x6	22.50	282.0	F	P	P	Zen.	Bos.	D	S	4	½	120	35x4½	U. S. L.	L
Spoerer 40	2	3000	5	3000	T	P 4½x5½	38.00	410.6	P	P	P	St.	Bos.	C	S	3	F	120	37x4½	G. & D.	R
Stearns-Knight Big-Four	2	3750	5	3750	—	P 4¼x5½	28.90	312.0	C	P	P	St.	Bos.	D	S	3	F	121	36x4½	G. & D.	L
Stearns-Knight Light-Four	—	—	5	1750	—	B 3¾x5½	22.50	—	P	P	P	Sch.	Bos.	C	S	3	½	119	34x4	G. & D.	L
Trumbull	2	395	—	—	—	B 2½x4	13.97	103.8	SP	T	G	*	Sp.	C	S	3	½	80	28x3	—	O
Vellie	2	1595	*5	1595	L	B 3½x5	19.60	—	SP	P	V	St.	A. K.	DP	S	4	½	124	*34x4	G. & D.	L
Vulcan	2	975	5	975	L	B 3½x5½	19.60	—	SP	T	G	St.	*West.	D	S	3	¾	120	33x4	West.	L
White 30	2	2650	5	2700	L	B 3¾x5½	22.50	—	SP	P	V	Ow	Bos.	DP	S	4	½	115	32x4	White	L
White 45	—	—	7	3800	L	B 4¼x6½	28.90	—	S	P	V	Ow	Bos.	DP	S	4	½	132¾	36x4½	White	L
Westcott O	2	1185	5	1185	L	B 3½x5	19.60	192.4	SP	P	G	Sch.	Del.	C	S	3	F	113	33x4	Del.	L
Willys-Knight	2	2475	5	2475	—	P 4 x5½	25.60	276.5	P	P	P	Zen.	Sim.	C	S	4	F	120	36x4½	U. S. L.	L

Mitchell—Five-passenger touring, \$1250; 4-passenger, \$1200; ignition, distributor. Partin-Palmer 20—Starter, \$75 extra; overvalve tires optional, 29x3½. Pullman, Jr.—Roadster, either 2 or 3-passenger. R. C. H.—Ward Leonard electric starter, \$100 extra. Remington—Roadster, tires 30x3½. Stutz—Fuel feed, gravity on roadster; force on touring; wheelbase, 120 inches on roadster; 130 on touring. Simplex—Manufacturers channels only; bodies to order; Simplex 38—4 and 5-passenger cars, \$5500; 6 and 7, \$5700; Simplex 50—4 and 5-passenger cars, \$6100; 6 and 7, \$6200; Simplex 75—4 and 5-passenger cars, \$6850; 6 and 7, \$7050; rear tires on Simplex 38 and 50, 37x5½; Simplex 75—Wheelbase, 124 or 137. Saxon—Special design lighting and starting, Detroit Starter Co., \$70 extra. S. G. V. J.—\$3200 is without starter, which is \$100 extra. Trumbull—Ignition, Breese Zephyr. Vellie—4-passenger touring, inc. \$160; tire also on 4-passenger, \$554½. Vulcan—Ignition, Westinghouse or Elsmann.

BODY STYLES BEING OFFERED THIS YEAR.

WITHOUT a doubt the one big surprise of the current automobile season is the wonderful development in body styles. In the following table a complete list of the various types being displayed by the domestic maker is given.

These run the scale of limousines, coupes, landaulets, sedans, cabriolets, phaetons, broughams, landaus, landau-phaetons, and most of the latter models in vested form. The Boston show will be replete with body styles of all descriptions.

What the Manufacturers Are Offering for 1915 in the Line of Closed Bodies.

EIGHT-CYLINDER LIMOUSINES.

Make and Model	Price	Seats
Cadillac Standard	\$3450	7
Cadillac Berline Limousine	3600	7

SIX-CYLINDER LIMOUSINES.

Make and Model	Price	Seats
Austin 66	\$4200	5
Chalmers Light Six 26-B	3200	7
Chandler	2750	5
Cole Big Six 660	3750	7
Hudson 6-40	2550	7
Hudson 6-54	3500	7
Kline-Kar	2850	5
Kline-Kar	2850	7
Locomobile 38 R-4	5400	7
Locomobile 38 R-5	5400	7
Locomobile 48 M-5	6200	7
McFarlan T	4000	7
Packard 5-48	5950	6
Packard 5-48	6000	7
Packard 5-48 Imperial Limousine	6100	6
Packard 5-48 Imperial Limousine	6150	7
Packard 5-48 Salon Limousine	6100	6
Packard 3-38	5000	7
Packard 3-38	4950	6
Packard 3-38 Imperial Limousine	5150	7
Packard 3-38 Salon Limousine	5100	7
Peerless All Purpose Six	3350	5
Peerless 48-6	6000	7
Pullman 6-48	3500	5
Stearns-Knight	6100	7
Winton 21	4600	7
Winton Three-Quarter Limousine	4350	7

FOUR-CYLINDER LIMOUSINES.

Make and Model	Price	Seats
Cunningham S	\$5000	7
Fiat 55	5650	7
Fiat Berline Limousine	5950	7
Great Western Sedan Limousine	3200	4
Great Western Berline Limousine	3800	6
Lyons-Knight K-4	4300	7
Lyons-Knight Berline Limousine	4300	7
Moline-Knight	3800	7
Peerless All Purpose	3100	5
Stearns-Knight L4	2850	7
White 45	5200	7

EIGHT-CYLINDER COUPES.

Make and Model	Price	Seats
Cadillac Landaulet-Coupe	\$2500	3
Cole 850	2185	4

SIX-CYLINDER COUPES.

Make and Model	Price	Seats
Austin 66, Close Coupled	\$3600	2
Chalmers 2 or 3-Passenger Coupelet	1900	..
Chandler	2200	2
Chandler Coupelet	1950	2
Cole Big Six	2750	3
Franklin 6-30	2600	3
Hudson 6-40	2150	4
Kline-Kar	2400	2
McFarlan T	3300	4
Marion G-r	2650	4
National	2850	4
Pierce-Arrow 38-C-3	5000	2
Pierce-Arrow 48-B-3	5700	2
Pierce-Arrow 66-A-3	6700	2

FOUR-CYLINDER COUPES.

Make and Model	Price	Seats
Cole 440	\$1885	3
Great Western 56-B	3200	2
Overland 80	1600	4
Reo	1575	4
Stutz 4-F	2600	2

SIX-CYLINDER LANDAULETS.

Make and Model	Price	Seats
Locomobile 38 R-4	\$5500	7
Locomobile 48 M-5	6300	7
Packard 5-48	6000	7
Packard 5-48	5900	6
Packard 3-38	5000	7
Packard 3-38	4900	6
Pierce-Arrow 38-C-3	5200	7
Pullman 6-48	3500	5
Stearns-Knight	6200	7
Stevens-Duryea D-6	6300	7
Winton 21	4600	7

FOUR-CYLINDER LANDAULETS.

Make and Model	Price	Seats
Cunningham S	\$5000	7
Fiat 55	5750	7
S. G. V. Landaulet-Brougham J	3200	5
White Landaulet-Limousine	5200	7

EIGHT-CYLINDER SEDANS.

Make and Model	Price	Seats
Cadillac	\$2800	5

SIX-CYLINDER SEDANS.

Make and Model	Price	Seats
Chalmers Light Six 26-B	\$2750	5
Chandler	2750	5
Franklin 6-30	3000	5
KisselKar 6-42 Detachable Sedan	2000	5
Marion G-5	2950	5
Pierce-Arrow 38-C-3	5200	5
Pullman 6-48	3200	5
Stutz 6-F	3800	6
Winton 21	4600	6

FOUR-CYLINDER SEDANS.

Make and Model	Price	Seats
Lyons-Knight K-4	\$3900	5
Moline-Knight	3250	5
Stutz 4-F	3675	6
White 30	4000	5

SIX-CYLINDER BERLINES.

Make and Model	Price	Seats
Franklin 6-30	\$3200	5
Locomobile 38 R-4	5700	7
Locomobile 48 M-5	6500	7
Stevens-Duryea D-6	6200	7

SIX-CYLINDER MISCELLANEOUS.

Make and Model	Price	Seats
King C	\$1490	2
KisselKar 6-42	1950	2
National	2700	3
Peerless All Purpose	2550	3

Phaetons.

Make and Model	Price	Seats
Hudson 6-40	\$1550	7
Packard 5-48	4750	4
Packard 5-48	4750	5
Packard 3-38	3750	4

Broughams.

Make and Model	Price	Seats
Packard 5-48	\$6000	6
Packard 5-48 Salon Brougham	5950	4
Packard 3-38	5000	6
Packard 3-38 Salon Brougham	4950	4
Pierce-Arrow 38-C-3	5200	7
Pierce-Arrow 48-B-3	5800	7
Pierce-Arrow 66-A-3	6800	7

Vestibule Broughams.

Make and Model	Price	Seats
Pierce-Arrow 38-C-3	\$5350	7
Pierce-Arrow 48-B-3	5950	7
Pierce-Arrow 66-A-3	6950	7

Landaus.

Make and Model	Price	Seats
Pierce-Arrow 48-B-3	\$6000	7
Pierce-Arrow 66-A-3	7000	7

Vestibule Landaus.

Make and Model	Price	Seats
Pierce-Arrow 48-B-3	\$6200	7
Pierce-Arrow 66-A-3	7200	7

Vestibule Landaulets.

Make and Model	Price	Seats
Pierce-Arrow 38-C-3	\$5350	7

Landau-Phaetons.

Make and Model	Price	Seats
Stevens-Duryea D-6	\$5600	7

Suburbans.

Make and Model	Price	Seats
Pierce-Arrow 43-B-3	\$6000	7
Pierce-Arrow 66-A-3	7000	7

Vestibule Suburbans.

Make and Model	Price	Seats
Pierce-Arrow 48-B-3	\$6200	7

Vestibule Brougham-Landaulet.

Make and Model	Price	Seats
Pierce-Arrow 66-A-3	7200	7
Pierce-Arrow 38-C-3	\$5350	7

Vestibule Suburban-Landau.

Make and Model	Price	Seats
Pierce-Arrow 48-B-3	\$6200	7
Pierce-Arrow 66-A-3	7200	7

Grant I	2	425	5	795	—	27/8x4 1/4	19.87	192.0	SP	T	G	—	A. K.	C	S	3	—	106	30x3	Electric
Haynes 30	2	1485	5	1485	L	B 3 1/2 x 5	29.40	288.6	SP	P	V	Ray.	—	D	S	3	F	121	34x4	Leece-N. L
Holley A-1	*2	2500	*5	2750	T	T 4 x 5	38.40	376.9	S	P	G	Car.	Remy	C	S	3	3/4	130	35x4 1/2	Ward-L. L
Hudson 6-40	3	1550	7	1550	L	T 3 1/2 x 5	29.40	288.6	P	P	G	Zen.	Del.	D	S	3	F	123 1/2	34x4	Delco
Hudson 6-54	—	—	—	2350	L	T 4 1/2 x 5 1/4	40.90	420.9	P	P	G	Zen.	Del.	D	S	4	F	135	36x4 1/2	Delco
Imperial 56	—	—	—	2200	L	T 3 3/4 x 5 1/4	33.75	347.8	C	P	V	St.	Sp.	D	S	3	F	130	36x4 1/2	N. East
Jeffery Chesterfield	2	1650	5	1650	L	B 3 x 5	21.60	212.0	C	P	V	—	Bos.	D	S	4	F	122	34x4	Bijur
Jeffery Big Six	—	—	—	2400	L	P 3 3/4 x 5 1/4	33.75	347.8	C	P	V	—	Bos.	D	S	4	F	133 1/2	34x4 1/2	U. S. L.
Jackson 48	—	—	—	1650	L	B 3 1/2 x 5	29.00	286.0	SP	P	G	St.	Del.	C	S	3	F	125	34x4 1/2	Delco
Knox 46	2	4500	7	4500	I	P 4 1/2 x 5 1/2	45.95	496.0	C	P	G	Scott	Bos.	D	S	3	F	134	38x5	Esterline
Knox 66	2	5000	7	5000	I	P 5 x 5 1/2	60.00	647.8	C	P	G	St.	Bos.	D	S	3	F	134	38x5 1/2	Esterline
Kline 42	2	1750	5	1750	L	B 3 1/2 x 5 1/2	29.40	295.8	C	P	G	*Ray.	West.	D	S	3	F	123	34x4	West.
Kline 42 A	—	—	—	1850	L	B 3 1/2 x 5 1/2	29.40	295.8	C	P	G	*St.	West.	D	S	3	F	127	35x4 1/2	West.
Kissel 42	2	1650	*5	*1650	L	B 3 3/4 x 5 1/2	31.50	340.5	SP	P	V	St.	—	C	S	3	F	125	34x4	Electric
Kissel 48	2	2350	*5	*2350	L	B 4 x 5 1/2	38.40	415.0	SP	P	V	St.	—	C	S	4	F	132	36x4 1/2	Electric
Kissel 60	2	3150	*5	*3150	L	P 4 1/2 x 5 1/4	48.60	501.0	SP	P	V	St.	—	C	S	4	F	142	37x5	Electric
Lexington 6-M	—	—	*5	*2575	L	T 4 1/2 x 5 1/4	40.90	420.9	C	P	V	St.	—	C	S	3	F	130	36x4 1/2	Jesco
Lexington 6-L	3	1875	5	1875	L	B 3 1/2 x 5	29.40	288.6	S	P	V	St.	Bos.	D	S	3	3/4	128	34x4	West.
Lenox Six	2	2465	6	2465	L	B 3 3/4 x 5 1/2	60.00	—	P	P	—	Own	West.	C	—	3	3/4	130	34x4 1/2	West.
Locomobile 38 L D	2	4400	5	4400	T	P 4 1/4 x 5	43.80	425.4	P	P	P	Own	Bos.	D	S	4	F	132	*36x4 1/2	West.
Locomobile 48 L D	2	5100	7	5100	T	P 4 1/2 x 5 1/2	48.60	524.8	P	P	P	Own	Bos.	D	S	4	F	132	*36x4 1/2	West.
Lewis VI	—	—	6	1600	L	B 3 1/2 x 6	29.40	346.4	C	P	G	St.	Bat.	D	S	4	F	140	*37x5	West.
Lozier	2	3250	5	3250	L	T 4 1/2 x 6 1/2	28.90	389.1	SP	P	P	St.	Bos.	D	S	3	F	135	36x4	Remy
Luverne	2	2250	7	2500	L	P 4 x 5	38.40	377.0	S	T	G	Ray.	Bos.	D	S	3	F	127 1/2	36x4 1/2	G. & D.
Moon 6-40	3	1575	6	1575	L	B 3 1/2 x 5	29.75	—	C	P	V	St.	Del.	D	S	3	F	130	36x4 1/2	Apple
Moon 6-50	3	2150	6	2250	L	T 3 3/4 x 5 1/4	33.75	—	C	P	P	St.	Del.	D	S	4	F	122	34x4	Del.
McIntyre Hoosier	—	—	5	1275	T	B 3 1/2 x 4 1/2	29.40	259.8	SP	T	G	St.	Br.	D	S	4	F	120	34x4 1/2	Electric
McFarlan T	2	2590	*5	2590	T	B 4 x 6	38.40	452.0	S	P	V	St.	West.	C	S	3	F	132	36x4 1/2	West.
McFarlan X	2	2900	*5	2900	T	B 4 1/2 x 6	48.00	—	S	P	V	St.	*	C	S	3	F	128	36x4	Apelco
Mitchell Light Six	2	1585	*5	1585	L	P 4 x 5 1/2	38.00	414.6	C	P	V	Ray.	Remy	C	S	3	F	132	36x4 1/2	Remy
Mitchell Big Six	2	1895	*5	1895	T	P 4 1/4 x 6	43.80	510.6	C	P	G	Ray.	Remy	C	S	3	F	144	37x5	Remy
Mitchell Six De Luxe	—	—	7	2350	T	P 4 1/4 x 7	43.80	595.8	C	P	G	Ray.	Remy	C	S	3	F	132	36x4 1/2	Remy
Marmon 41	2	3250	*5	3250	L	T 4 1/2 x 5 1/2	43.50	468.0	P	P	P	St.	Bos.	C	S	3	F	132	36x4 1/2	Bosch
Marmon 48	2	5000	7	5000	T	P 4 1/2 x 6	48.60	572.5	P	P	P	Zen.	Bos.	C	S	3	F	145	36x4 1/2	Roth
National Series A B	2	2375	*5	2375	L	B 3 3/4 x 5 1/2	33.75	364.4	SP	P	P	Ray.	Eise.	D	S	3	F	134	36x4 1/2	West.
Norwalk C	—	—	6	3500	T	T 4 x 5 1/2	38.40	—	S	P	V	Ray.	A. K.	D	S	4	F	136	39x5	West.
Norwalk F	2	1875	6	1875	L	B 3 1/2 x 5 1/4	29.40	—	S	P	V	Ray.	A. K.	D	S	4	1/2	131	37x4	G. & D.
Oakland 6-49	2	—	7	1685	L	B 3 1/2 x 5	29.40	288.6	S	P	V	John.	Del.	C	S	3	F	123 1/2	35x4 1/2	Delco
Oldsmobile 55	—	—	7	2975	L	P 4 1/4 x 5 1/4	43.80	446.7	S	P	P	Mar.	Del.	C	S	3	F	139	36x5	Delco
Overland 82	—	—	7	1475	L	B 3 1/2 x 5 1/4	29.40	303.0	P	P	V	Sch.	Bos.	C	S	3	F	125	35x4 1/2	Ow
Pathfinder 7 B and 7 C	4	2222	7	2322	L	B 3 3/4 x 5 1/4	33.75	347.8	SP	P	G	Sch.	West.	D	S	4	F	125	34x4 1/2	West.
Pathfinder 6-L	—	—	7	2750	L	B 4 1/2 x 5 1/4	40.80	—	SP	P	G	Sch.	West.	D	S	4	F	135	35x5	West.
Pathfinder Daniel Boone	2	2222	5	2222	L	B 3 3/4 x 5 1/4	33.75	347.8	SP	P	G	Sch.	West.	D	S	4	F	125	34x4 1/2	West.
Paterson 6-48	—	—	5	1495	L	B 3 1/2 x 5	29.50	288.6	SP	P	V	St.	Del.	C	S	3	F	124	34x4	Delco

*Apparatus 6-60—Wheelbase of 122 inches for two-passenger roadster; the five-passenger touring is 128 and the seven-passenger touring, 134 inches; the tire size given is for roadster and five-passenger touring, the seven-passenger carries 37x5 1/2. Austin 60—Roadster, either 2 or 3 passengers; touring, either 4, 5 or 6; three-speed transmission in combination with Austin two-speed axle, giving 6 speeds forward and two reverse. Chadwick 19—Touring, either 5 or 7 passengers. Chalmers 28—Touring, either 5 or 7 passengers. Chalmers 26 B—5 passengers, \$1650; 7 passengers, \$1725. Chevrolet Light—Bore and stroke, 3 5/16x5 1/4; Chasale, 3 9/16x5. Cole 60—Touring seats either 4, 5 or 7; model 600, either 4, 5, 6 or 7. Crane—Model 1, 2, 3 and 4, chassis only; rear tires, 37x5. Enger 6-50—Either 6 or 7 passengers. Flat—Bore and stroke, 4 2/16x6; rear tires, 37x5. Holley A-1—Roadster, 2 or 3 passengers; touring, 5 or 7. Kline, 42 and 42 A—Either Rayfield or Stromberg carburetor. Kline 42—5-passenger touring, \$1850; 48—5 and 7-passenger, \$2350, and 5 and 7-passenger, 60, \$3150. Lexington 6-M—5-passenger, \$2575; 7-passenger, \$2675. Locomobile 38 L D and 48 L D—Front tires, 38x4 1/2, rear, 37x5. McFarlan T and X—Touring, choice of 5, 6 or 7 passengers. Mitchell

SPECIFICATIONS OF 1915 SIX-CYLINDER CARS.

Key to Abbreviations: Cylinder type—L, valves in the head; L, L head; T, T head. How cast—B, on block; P, in pairs; S, separately; T, in triplets. Lubrication—C, combination; P, pressure; S, splash; SF, splash with pump circulation. Cooling—A, air; P, pump; T, thermo-siphon. Fuel feed—G, gravity; P, pressure. V, vacuum. Carburetor—A, W. T. Car, Carter; C, Ft. St. Fletcher; Hol, Holley; John, Johnson; King, Kingston; Mar, Marvel; May, May; Newcomb, Newcomb; Pl, Plankard; Ray, Rayfield; Sch, Seebler; Stew, Stewart; St., Stromberg; Zen, Zenith; Zep, Zephyr. Ignition—A, K., Atwater Kent; Bos, Bosch; Br, Briggs; Conn, Connecticut; Del, Delco; Elise, Elscamann; King, Kingston; Mich, Michigan; Nat, National; Sim, Simam; Spl, Splittord; West, Westinghouse. Clutch—C, cone; CB, contracting band; D, disc; DP, dry plate; ER, expanding band. Transmission—F, friction; PF, double friction; Pl, planetary; Pr, progressive; S, selective. Rear axle—D, dead; F, full floating; R, semi-floating; S, three-quarter floating. Starting and lighting—App, Apple; Apl, Aples; HJ, Hiltner; Dyn, Dynet; G, & D, Gray & Davis; Leece-N, Leece-Neville; N, East, Northeast; Rukh, Roth Bros. Special; Rukh, Rukhmore; Sim, Simam; Ward-L, Ward-Leonard; West, Westinghouse. Driver—L, left; R, right; O, optional.

Make and Model	Roadster			Touring		Cyl. Type	How Cast	Bore and Stroke	Displacement	Lubrication	Cooling	Fuel Feed	Carburetor	Ignition	Clutch	Transmission	Speeds	Rear Axle	Wheelbase	Tires	Lighting and Starting	Driver
	Seats	Price	Seats	Price	Price																	
Pratt 6-50	2	2150	*5	2150	L	T	3 3/4 x 5 1/4	33.75	281.6	SP	P	G	Ray.	A. K.	D	S	4	—	132	37 x 4 1/2	G. & D.	L
Pneumobile 6-50	2	1975	*4	1975	L	B	3 1/2 x 5 1/8	29.40	295.8	P	P	V	Ray.	A. K.	DP	S	4	F	132	37 x 4 1/2	G. & D.	L
Pierce-Arrow 38 C-3	2	4300	5	4300	T	P	4 x 5 1/2	38.40	414.7	P	P	P	Own	Bos.	C	S	4	1/2	134	36 x 4 1/2	P-West.	R
Pierce-Arrow 48 B-3	2	4900	7	5000	T	P	4 1/2 x 5 1/2	48.60	524.8	P	P	P	Own	Bos.	C	S	4	1/2	142	37 x 5	P-West.	R
Pierce-Arrow 66 A-3	2	5900	5	5900	T	P	5 x 7	60.00	824.8	P	P	P	Own	Bos.	C	S	4	1/2	147 1/2	37 x 5	P-West	R
Premier 6-49	2	2385	*5	2385	T	T	4 x 5 1/2	31.60	414.7	S	P	P	*Ray.	Eise.	D	S	3	3/4	132	36 x 4 1/2	Remy	L
Premier-Weidely	2	2700	*5	2700	I	B	3 5/8 x 5 1/4	38.40	340.3	P	P	V	*Ray.	Eise.	D	S	3	3/4	132	36 x 4 1/2	Remy	L
Pilot 55	2	1885	*5	1885	T	B	3 1/2 x 5 1/4	29.45	303.0	S	P	P	Sch.	West.	C	S	3	7/8	126	34 x 4	West.	L
Pilot 75	2	2885	*4	2885	T	B	4 1/2 x 6	48.60	572.0	S	P	P	*Car.	West.	C	S	3	F	132	37 x 4 1/2	West.	O
Paige 6-46	3	1395	7	1395	L	B	3 1/2 x 5 1/4	24.95	303.1	SP	P	G	Ray.	Bos.	D	S	3	F	124	34 x 4	G. & D.	L
Peerless All Purpose	3	2250	5	2280	L	B	3 1/2 x 5	29.40	288.6	S	P	V	St.	A. K.	D	S	3	1/2	121	34 x 4	G. & D.	—
Peerless 48-6	4	5000	7	5000	T	P	4 1/2 x 6	48.60	572.5	S	P	P	Own	Bos.	EB	S	4	F	137	36 x 4 1/2	G. & D.	O
Peerless 55	4	5000	7	5000	T	P	4 1/2 x 6	48.60	572.5	S	P	P	Own	Bos.	EB	S	4	F	137	36 x 4 1/2	G. & D.	—
Packard 3-38	2	3750	7	3850	L	T	4 x 5 1/2	38.00	414.6	P	P	P	Own	Bos.	DP	S	3	1/2	140	*36 x 4 1/2	Bijur	L
Packard 5-48	2	3850	7	4850	L	T	4 1/2 x 5 1/2	48.60	524.8	P	P	P	Own	Bos.	DP	S	3	1/2	144	37 x 5	Bijur	L
Pullman 6-48	*2	2500	*5	2500	L	T	4 3/4 x 5 1/4	33.70	347.8	P	P	G	St.	Sim.	D	S	4	F	134	36 x 4 1/2	West.	L
Reo Six	—	—	5	1385	L	T	*	30.40	306.0	S	P	G	John.	—	DP	S	3	F	122	34 x 4	Remy	L
Republic E	—	—	*5	2950	T	P	4 1/4 x 5	43.80	425.4	C	P	V	Ray.	Delco	C	S	4	F	132	36 x 4 1/2	Delco	L
Studebaker	—	—	*5	1385	L	B	3 1/2 x 5	29.40	288.6	CP	P	G	Sch.	Remy	C	S	3	F	121	34 x 4	Wagner	L
Stutz	2	2125	6	2400	T	T	4 x 5	38.40	356.9	P	P	*G	St.	Eise.	C	—	3	—	*120	34 x 4 1/2	Remy	R
Stevens-Duryea D-6	*2	4550	5	4550	L	P	4 3/8 x 5 1/2	46.00	496.0	SP	P	G	Own	Bos.	DP	S	3	F	131	37 x 4 1/2	Delco	L
Stevens-Duryea DD-6	—	—	7	4800	L	P	4 3/8 x 5 1/2	46.00	510.3	SP	P	G	Own	Bos.	DP	S	3	F	138	37 x 5	Electric	L
Speedwell Rotary	2	2850	7	2950	*	T	4 1/8 x 5 1/4	40.90	420.9	SP	P	V	Sch.	West.	D	S	3	F	135	37 x 5	West.	L
Singer Six	3	2350	5	2350	T	T	4 x 5 1/2	38.00	414.6	SP	P	P	C.R.G.	Eise.	DP	S	4	F	135	36 x 4 1/2	West.	L
Saxon Six	2	395	5	785	L	B	2 7/8 x 4 1/2	19.78	—	P	T	G	—	A. K.	D	S	3	3/4	112	32 x 3 1/2	G. & D.	L
Stearns-Knight	2	4850	5	4850	—	P	4 1/4 x 5 3/4	43.30	489.4	C	P	P	St.	Bos.	D	S	4	F	140	37 x 5	G. & D.	L
Velie 6-50	2	2015	5	2015	L	T	3 3/4 x 5 1/4	33.75	347.8	C	P	P	St.	Bos.	D	S	4	F	126	37 x 4 1/2	G. & D.	L
Winton	2	3250	*5	3250	L	P	4 1/2 x 5 1/2	48.60	524.8	C	P	G	Ray.	Bos.	D	S	4	F	*130	37 x 5	G. & D.	L
*White	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Westcott U	3	1585	7	1585	L	B	3 1/2 x 5	29.40	288.6	SP	P	V	Ray.	Del.	C	S	3	F	125	34 x 4	Del.	L
Zimmerman	—	—	5	1750	L	P	4 x 5	38.40	376.9	S	P	P	Sch.	Remy	D	S	3	F	132	36 x 4	Remy	O

Pratt 6-50—Five-passenger touring, \$2150; 7-passenger, \$2250. Pneumobile 6-50—Four-passenger touring, \$1975; 6-passenger, \$2000. Premier 6-49—Five-passenger touring, \$2385; 7-passenger, \$2450. Rayfield or Carter, \$2450; carburetor, Rayfield or Carter. Pilot 55—Five or 7-passenger touring, \$1885. Pilot 75—Four, 5, 6 or 7-passenger touring, carburetor, Carter or Stromberg. Pullman 6-48—Five-passenger touring, \$2500; 7-passenger, \$2600; 7-passenger, \$2650. Reo Six—Four and Brook, 3 5/8/16.5. Republic E—Five or 7-passenger touring, \$1385; 7-passenger, \$1450. Stevens-Duryea D-6—Roadster, either 2 or 3 passengers. Stevens-Duryea DD-6—Four and Brook, 3 5/8/16.5. Stutz—Five or 7-passenger touring, \$2400; 7-passenger, \$2450. Singer Six—Five or 7-passenger touring, \$2350; 7-passenger, \$2400. Saxon Six—Five or 7-passenger touring, \$395; 7-passenger, \$400. Stearns-Knight—Five or 7-passenger touring, \$4850; 7-passenger, \$4900. Velie 6-50—Five or 7-passenger touring, \$2015; 7-passenger, \$2050. Winton—Five or 7-passenger touring, \$3250; 7-passenger, \$3300. *White—Six-cylinder withdrawn from stock; built to order.

SPECIFICATIONS OF 1915 EIGHT-CYLINDER CARS.

Key to Abbreviations: Cylinder type—L, valves in the head; L, L head; T, T head. How cast—B, on block; P, in pairs; S, separately; T, in triplets. Lubrication—C, combination; P, pressure; S, splash; SP, splash with pump circulation. Cooling—A, air; P, pump; T, thermo-syphon. Fuel feed—G, gravity; P, pressure. V, vacuum. Carburetor—A, W. T.; Car, Carter; C, H. G.; Flet, Fletcher; Hol, Holley; John, Johnson; King, Kingston; Mar, Marvel; May, Mayer; New, Newcomb; PL, Plankard; Ray, Rayfield; Sch, Schieber; Stew, Stewart; St, Stromberg; Zen, Zenith; Zep, Zephyr. Ignition—A, K., Atwater Kent; Bos, Bosch; Br, Briggs; Can, Connecticut; Del, Delco; Elm, Elmore; Klag, Kingston; Mich, Michigan; Nat, National; Sim, Simms; Spl, Spittler; West, Westinghouse. Clutch—C, coast; CB, contracting band; D, disc; DP, dry plate; MB, expanding band. Transmission—F, friction; FF, double friction; Pl, planetary; Pt, progressive; S, selective. Rear axle—D, dead; E, full seating; ½, semi-seating; ¾, three-quarter seating. Starting and lighting—App, Apple; Apl, Apoloni; BU, Biluri; Dyn, Dyneto; G. & D, Gray & Davis; Leece-N, Leece-Neville; N, East, Northeast; Reth, Roth Bros. Special; Rush, Rushmore; Sim, Simms; Ward-L, Ward-Leonard; West, Westinghouse. Driver—L, left; R, right; O, optional.

Make and Model	Roadster Touring			Cyl. Type.	How Cast	Bore and Stroke	S. A. E. H. P.	Piston Displacement	Lubrication	Cooling	Fuel Feed	Carburetor	Ignition	Clutch	Transmission	Speeds	Rear Axle	Wheelbase	Tires	Lighting and Starting	Driver
	Seats	Price	Price																		
Abbott	3	\$1685	5	\$1685	L	B	3 1/8x4 1/2	31.25	—	P	V	Zen.	A. K.	DP	S	3	F	116	34x4	*Remy Del.	L
Cadillac	4	1975	7	1975	L	B	3 1/8x5 1/8	31.28	314.0	P	P	Own	Del.	DP	S	3	F	122	36x4 1/2	Del.	L
Cole	3	1785	7	1785	L	B	3 1/8x4 1/2	39.22	346.0	P	P	St.	Del.	C	S	3	F	126	35x4 1/2	Del.	L
Detroit	—	5	1295	5	1295	L	B	2 3/4x4 1/2	24.20	P	P	Zen.	*	DP	S	3	F	112	33x4	*	L
King D	2	1350	5	1350	L	B	2 3/4x5	24.20	237.5	P	T	Own	A. K.	DP	S	3	F	113	33x4	Ward-L.	L
Regal	—	—	5	1250	L	B	2 7/8x4 1/2	23.20	233.7	—	—	—	A. K.	—	S	3	¾	112	33x4	Electric	L
Remington	2	1495	*4	1495	—	—	3 1/8x4 1/2	31.25	276.1	P	P	Zen.	A. K.	DP	S	3	F	116	35x4 1/2	G. & D.	L
Ross	—	—	5	1350	L	B	3 x4 1/2	28.40	—	P	T	—	A. K.	D	S	3	—	115	34x4	Own	L

*Abbott—Starting and lighting, Remy or Disco. Detroit—Ignition, distributor; starting and lighting, two-unit Remington—Built with 2, 4 or 6-passenger body.

RECEIVED TOO LATE FOR CLASSIFICATION.

Make and Model	Roadster Touring			Cyl. Type.	How Cast	Bore and Stroke	S. A. E. H. P.	Piston Displacement	Lubrication	Cooling	Fuel Feed	Carburetor	Ignition	Clutch	Transmission	Speeds	Rear Axle	Wheelbase	Tires	Lighting and Starting	Driver
	Seats	Price	Price																		
Kearns, D. T. R. Four	2	\$550	4	\$590	L	B	2 7/8x4 1/2	13.25	—	P	G	Op.	Ber.	D	S	3	1 1/2	107	30x3	Allis-C. Op.	L
Mercer Touring Four	—	—	6	3000	L	B	3 3/4x6 3/4	22.50	298.2	P	P	Zen.	Bos.	DP	S	4	F	130	34x4 1/2	U. S. L.	L
Mercer Sporting Four	—	—	4	3000	L	B	3 3/4x6 3/4	22.50	298.2	P	P	Zen.	Bos.	DP	S	4	F	130	34x4 1/2	U. S. L.	L
Mercer Runabout Four	2	2900	—	—	L	B	3 3/4x6 3/4	22.50	298.2	P	P	Zen.	Bos.	DP	S	4	F	115	32x4	U. S. L.	L
Mercer Raceabout Four	2	2750	—	—	L	B	3 3/4x6 3/4	22.50	298.2	P	P	Zen.	Bos.	DP	S	4	F	115	32x4	—	L
Spaulding H Four	2	1680	5	1680	L	B	4 1/4x5 1/2	28.90	312.0	SP	G	Ray.	Sim.	C	S	3	F	120	36x4	Entz	L

SPECIFICATIONS OF 1915 ELECTRIC CARS.

Key to Abbreviations: Battery make—E, Edison; EX, Exide; G, Gould; GV, General Vehicle; P, Philadelphia; SP, special; U, U. S. L.; W, Willard; O, optional. Battery location—F, front; R, rear; FR, front and rear. Style of drive—B, bevel gear; C, chain; W, worm. Steering—L, lever. Control—L, left. Pedal or brake—L, left; R, right; O, optional.

Company	Model	Type	Price	Weight	Max. Speed	Mileage Per Charge	Battery Make	Battery Location	Speeds Forward	Style of Drive	Front Tires	Rear Tires	Steering	Control Lever	Brake or Pedal
American Electric Car Co., Saginaw, Mich.	Borland 50	Brougham	\$2550	3700	22	95	EX	FR	6	B	34x4	34x4	L	L	L
American Electric Car Co., Saginaw, Mich.	Borland 52	Roadster	2250	3200	25	95	EX	FR	7	B	34x4	34x4	L	L	L
American Electric Car Co., Saginaw, Mich.	Borland 60	Limousine	5500	4800	20	95	EX	FR	6	B	37x5	37x5	L	L	L
American Electric Car Co., Saginaw, Mich.	Argo A	Brougham	2650	3700	22	95	EX	F	5	B	36x4	36x4	L	L	L
American Electric Car Co., Saginaw, Mich.	Argo B	Roadster	2350	3200	22	95	—	F	—	—	—	—	L	L	L
American Electric Car Co., Saginaw, Mich.	Argo C	Brougham	2800	3700	22	95	—	FR	—	—	—	—	L	L	L
American Electric Car Co., Saginaw, Mich.	Broc 33	Brougham	3100	3650	22	95	EX	FR	5	B	34x4	34x4	L	L	L
American Electric Car Co., Saginaw, Mich.	Broc 34	Brougham	3150	3650	22	95	EX	FR	5	B	34x4	34x4	L	L	L
American Electric Car Co., Saginaw, Mich.	Broc 36	Brougham	3200	3700	22	95	EX	FR	5	B	34x4	34x4	L	L	L
American Electric Car Co., Saginaw, Mich.	Detroit 50	Cabriolet	2650	—	20	85	O	—	5	W	36x4½	36x4½	—	—	—
Anderson Electric Car Co., Detroit, Mich.	Detroit 51	Brougham	2850	—	20	85	O	—	5	W	36x4½	36x4½	—	—	—
Anderson Electric Car Co., Detroit, Mich.	Detroit 52	Brougham	3000	—	20	85	O	—	5	W	36x4½	36x4½	—	—	—
Anderson Electric Car Co., Detroit, Mich.	Detroit 53	Brougham	2950	—	20	85	O	—	5	W	36x4½	36x4½	—	—	—
Anderson Electric Car Co., Detroit, Mich.	Detroit 54	Brougham	2950	—	20	85	O	—	5	W	36x4½	36x4½	—	—	—
Anderson Electric Car Co., Detroit, Mich.	Detroit 55	Brougham	2600	—	20	85	O	—	5	W	36x4½	36x4½	—	—	—
Baker Motor Vehicle Co., Cleveland, O.	DA	Coupe	2800	—	—	—	EX	—	7	—	32x4	34x4	—	—	—
Baker Motor Vehicle Co., Cleveland, O.	WA	Roadster	2300	—	—	—	EX	—	7	—	32x4	34x4	—	—	—
Baker Motor Vehicle Co., Cleveland, O.	WB	Roadster	2300	—	—	—	EX	—	7	—	32x4	34x4	—	—	—
Baker Motor Vehicle Co., Cleveland, O.	BBD	Brougham	3250	—	—	—	EX	—	7	—	32x4	34x4	—	—	—
Beardsley Electric Co., Los Angeles, Cal.	100B	Brougham	3000	3350	25	100	G	FR	5	B	33x4	33x4	L	L	L
Beardsley Electric Co., Los Angeles, Cal.	200B	Roadster	2500	3300	30	100	G	FR	—	B	33x4	33x4	L	L	L
Beardsley Electric Co., Los Angeles, Cal.	300B	Victoria	2750	3350	25	100	G	FR	5	B	33x4	33x4	L	L	L
S. R. Bailey & Co., Amesbury, Mass.	F	*Roadster	2900	2750	25	100	E	—	6	C	33x4	33x4	L	—	—
S. R. Bailey & Co., Amesbury, Mass.	F	*Roadster	3300	3100	25	80	E	—	6	C	34x4	34x4	L	—	—
S. R. Bailey & Co., Amesbury, Mass.	E-2	*Roadster	*2500	2650	25	100	E	—	—	C	33x4	33x4	—	—	—
Buffalo Electric Vehicle Co., Buffalo, N. Y.	36	Coupe	3250	3800	25	75	T	FR	16	B	34x4½	34x4½	W	*	O
Century Electric Car Co., Detroit, Mich.	LB	Brougham	3250	3900	23	100	O	FR	4	B	34x4½	34x4½	L	L	L
Century Electric Car Co., Detroit, Mich.	SB	Brougham	2650	3100	21	90	O	FR	6	B	34x4	34x4	L	L	L
Flanders Electric, Inc., Detroit, Mich.	K	Coupe	1750	2500	23	80	W	FR	6	W	33x4	33x4	L	L	L
Grinnell Electric Car Co., Detroit, Mich.	R	French B'am	3400	3750	20	100	P	FR	5	B	36x4½	34x4½	—	L	L
Grinnell Electric Car Co., Detroit, Mich.	S	Brougham	3000	3300	21	100	P	FR	5	B	36x4½	34x4½	—	L	L
Ohio Electric Car Co., Toledo, O.	61	Brougham	3250	3800	22	65-85	SP	FR	5	*W	*34x4½	*34x4½	L	L	L
Ohio Electric Car Co., Toledo, O.	41	Brougham	2900	3600	22	85	SP	FR	5	*W	*36x4	*36x4	L	L	L
Ohio Electric Car Co., Toledo, O.	21	Roadster	2650	3600	22	85	SP	FR	5	*W	*34x4	*34x4	*L	L	L
Ohio Electric Car Co., Toledo, O.	1234	—	2800	3525	25	80	EX	FR	6	B	34x4	34x4	L	L	L
New Columbus Buggy Co., Columbus, O.	1230	—	2350	2880	21	90	EX	FR	6	B	34x4	34x4	L	L	L

Addresses of Gasoline Car Makers

Abbott-Detroit—Consolidated Car Co., Detroit, Mich.
Allen—Allen Motor Car Co., Fostoria, O.
Apperson—Apperson Bros. Automobile Co., Kokomo, Ind.
Arbenz—Arbenz Car Co., Chillicothe, O.
Argo—Argo Motor Co., Jackson, Mich.
Auburn—Auburn Automobile Co., Auburn, Ind.
Austin—Austin Automobile Co., Grand Rapids, Mich.

Bauer—Bauer Machine Works Co., Kansas City, Mo.
Benham—Benham Mfg. Co., Detroit, Mich.
Briscoe—Briscoe Motor Car Co., Jackson, Mich.
Bulek—Buick Motor Co., Flint, Mich.

Cadillac—Cadillac Motor Car Co., Detroit, Mich.
Cartercar—Cartercar Co., Pontiac, Mich.
Case—J. I. Case Threshing Machine Co., Racine, Wis.
Chadwick—Chadwick Engineering Works, Pottstown, Penn.
Chalmers—Chalmers Motor Co., Detroit, Mich.
Chandler—Chandler Motor Car Co., Cleveland, O.
Chevrolet—Chevrolet Motor Co., Flint, Mich.
Coey—Coey Motor Co., Chicago, Ill.
Corbitt—Corbitt Automobile Co., Henderson, N. C.
Cornellian—Blood Bros. Machine Co., Kalamazoo, Mich.
Crane—Crane Motor Car Co., Rayonne, N. J.
Crawford—Crawford Automobile Co., Hagerstown, Md.
Crescent—Crescent Motor Co., Cincinnati, O.
Crow-Elkhart—Crow Motor Car Co., Elkhart, Ind.
Cunningham—J. Cunningham Son & Co., Rochester, N. Y.
Cycleplane—Cycleplane Co., Westerly, R. I.

Davis—Geo. W. Davis Co., Richmond, Ind.
Detroit—Briggs-Detroit Car Co., Detroit, Mich.
Dille—Dille Motor Car Co., Reading, Penn.
Dispatch—Dispatch Motor Car Co., Minneapolis, Minn.
Dodge—Dodge Brothers, Detroit, Mich.
Dorris—Dorris Motor Car Co., St. Louis, Mo.
Dort—Dort-Dort Carriage Co., Flint, Mich.
Duryea—Cresson-Morris Co., Philadelphia, Penn.

Eagle-Macomber—Eagle-Macomber Motor Car Co., Chicago, Ill.
Empire—Empire Automobile Co., Indianapolis, Ind.
Enger—Enger Motor Car Co., Cincinnati, O.

Fal—F. A. L. Motor Car Co., Chicago, Ill.
Flat—Flat Automobile Co., Poughkeepsie, N. Y.
Firestone-Columbus—New Columbus Buggy Co., Columbus, O.
Ford—Ford Motor Co., Detroit, Mich.
Franklin—H. H. Franklin Mfg. Co., Syracuse, N. Y.
F. R. P.—F. R. P. Motor Co., Port Jefferson, L. I., N. Y.

Gadabout—Gadabout Motor Corp., Newark, N. J.
Gilde—Bartholomew Co., Peoria, Ill.
Grant—Grant Motor Co., Findlay, O.
Great Southern—Great Southern Auto Co., Birmingham, Ala.
Great Western—Great Western Automobile Co., Peru, Ind.
Greyhound—Greyhound Motor Co., Toledo, O.

Halladay—Barley Mfg. Co., Streator, Ill.
Haynes—Haynes Automobile Co., Kokomo, Ind.
Hercules—Hercules Motor Car Co., New Albany, Ind.
Herff-Brooks—Herff-Brooks Co., Indianapolis, Ind.
Herreshoff—Herreshoff Motor Co., Detroit, Mich.
Hudson—Hudson Motor Car Co., Detroit, Mich.
Hupmobile—Hupp Motor Car Co., Detroit, Mich.

Imperial—Imperial Automobile Co., Jackson, Mich.
Inter-State—Inter-State Motor Co., Muncie, Ind.

Jackson—Jackson Automobile Co., Jackson, Mich.
Jeffery—Thomas B. Jeffery Co., Kenosha, Wis.

Kearns—Kearns Motor Truck Co., Beavertown, Penn.
King—King Motor Car Co., Detroit, Mich.
Kisselkar—Kissel Motor Car Co., Hartford, Wis.
Klinekar—Kline Motor Car Corp., Richmond, Va.
Krit—Krit Motor Car Co., Detroit, Mich.

Lambert—Buckeye Mfg. Co., Anderson, Ind.
Lenox—Lenox Motor Car Co., Boston, Mass.
Lewis—L. P. C. Motor Co., Racine, Wis.
Lexington—Lexington-Howard Co., Connersville, Ind.
Locomobile—Locomobile Co. of America, Bridgeport, Conn.
Luverne—Luverne Automobile Co., Luverne, Minn.
Lyons-Knight—Lyons-Atlas Co., Indianapolis, Ind.

Marion—Marion Motor Car Co., Indianapolis, Ind.
Marmon—Nordyke & Marmon Co., Indianapolis, Ind.
Maxwell—Maxwell Motor Co., Inc., Detroit, Mich.
McFarlan—McFarlan Motor Co., Connersville, Ind.
McIntyre—W. H. McIntyre Co., Auburn, Ind.
Mercer—Mercer Automobile Co., Trenton, N. J.
Meteor—Meteor Motor Car Co., Shelbyville, Ind.
Metz—Metz Co., Waltham, Mass.
Mitchell—Mitchell-Lewis Motor Co., Racine, Wis.
Moline-Knight—Moline Automobile Co., East Moline, Ill.
Monarch—Monarch Motor Car Co., Detroit, Mich.
Monroe—Monroe Motor Car Co., Flint, Mich.
Moon—Moon Motor Car Co., St. Louis, Mo.
Morse—Easton Machine Co., South Easton, Mass.
Motorette—Kelsey Motor Co., Hartford, Conn.

National—National Motor Vehicle Co., Indianapolis, Ind.
Norwalk—Norwalk Motor Car Co., Martinsburg, W. Va.

Oakland—Oakland Motor Car Co., Pontiac, Mich.
Ogren—Ogren Motor Car Co., Chicago, Ill.
Oldsmobile—Olds Motor Works, Lansing, Mich.
Overland—Willis-Overland Co., Toledo, O.
Owen—R. M. Owen & Co., New York City.

Packard—Packard Motor Car Co., Detroit, Mich.
Paige—Paige-Detroit Motor Car Co., Detroit, Mich.
Partin-Palmer—Partin Mfg. Co., Chicago, Ill.
Paterson—W. A. Paterson Co., Flint, Mich.
Pathfinder—Motor Car Mfg. Co., Indianapolis, Ind.
Peerless—Peerless Motor Car Co., Cleveland, O.
Pierce-Arrow—Pierce-Arrow Motor Car Co., Buffalo, N. Y.
Pilgrim—Pilgrim Motor Car Co., Detroit, Mich.
Pilot—Pilot Motor Car Co., Richmond, Ind.
Pneumobile—Cowles MacDowell Pneumobile Co., Chicago, Ill.

Pratt—Elkhart Car Mfg. Co., Elkhart, Ind.
Premier—Premier Motor Mfg. Co., Indianapolis, Ind.
Pullman—Pullman Motor Car Co., York, Penn.

Rayfield—Rayfield Motor Car Co., Chrisman, Ill.
R-C-H—R-C-H Corporation, Detroit, Mich.
Regal—Regal Motor Car Co., Detroit, Mich.
Remington—Remington Motor Co., New York City.
Reo—Reo Motor Car Co., Lansing, Mich.
Republic—Republic Motor Car Co., Hamilton, O.
Richard—Richard Auto Mfg. Co., Cleveland, O.
Ross—Ross & Young Machine Co., Detroit, Mich.

Saginaw—Valley Boat & Engine Co., Saginaw, Mich.
Salter—Salter Motor Mfg. Co., Kansas City, Mo.
Saxon—Saxon Motor Co., Detroit, Mich.
Scripps-Booth—Scripps-Booth Company, Detroit, Mich.
S. E. M.—Sharp Engineering & Mfg. Co., Detroit, Mich.
S. G. V.—S. G. V. Co., Reading, Penn.
Simplex—Simplex Automobile Co., New Brunswick, N. J.
Singer—Singer Motor Co., Long Island City, N. Y.
Snyder—Snyder Motor & Mfg. Co., Cleveland, O.
Spaulding—Spaulding Mfg. Co., Grinnell, Ia.
Speedwell—Speedwell Motor Car Co., Dayton, O.
Sphinx—Sphinx Motor Co., York, Penn.
Spoerer—Carl Spoerer's Sons Co., Baltimore, Md.
Stearns-Knight—F. B. Stearns Co., Cleveland, O.
Steco—Stevens Co., Chicago, Ill.
Stevens-Duryea—Stevens-Duryea Co., Chicopee Falls, Mass.
Studebaker—Studebaker Corporation, Detroit, Mich.
Stutz—Stutz Motor Car Co., Indianapolis, Ind.

Touraine—Touraine Co., Philadelphia, Penn.
Traveler—Traveler Motor Car Co., Detroit, Mich.
Trumbull—Trumbull Motor Car Co., Bridgeport, Conn.
Twombly—Twombly Car Corp., Nutley, N. J.

Velle—Velle Motor Vehicle Co., Moline, Ill.
Victor—Victor Motor Car Co., Philadelphia, Penn.
Vixen—Davis Mfg. Co., Milwaukee, Wis.
Vulcan—Vulcan Mfg. Co., Painesville, O.

Westcott—Westcott Motor Car Co., Richmond, Ind.
White—White Co., Cleveland, O.
Winton—Winton Motor Car Co., Cleveland, O.
Woods Mobillette—Woods Mobillette Co., Harvey, Ill.

Zimmerman—Zimmerman Mfg. Co., Auburn, Ind.
Zip—Zip Motor Car Co., Davenport, Ia.

GENERAL NEWS OF THE INDUSTRY.

Samuel Winternitz & Co., Purchases Assets of Krit Motor Car Company and a Reorganization Is Planned—New Concerns and Business Changes.

THAT the Krit Motor Car Company, Detroit, Mich., will be reorganized and the business of the company continued, has been made clear in a notice sent out by that concern. The company's letter to its dealers says: "Since the temporary receiver was appointed for this concern, Dec. 28, practically every dealer has written regarding the future of the Krit Motor Car Company. Naturally each one is vitally interested. The Krit Company will be continued. This is absolute and positive. The old company has been sold and a complete reorganization has been effected. The business will be carried on the same as formerly and will remain in the same factory. The name of the new concern will remain unchanged".

The combined assets of the Krit Company and the Krit Sales Company, Detroit, Mich., which had been appraised by these companies at a total of \$879,347, and by the official appraiser at \$210,436, were purchased for \$120,000 by Samuel Winternitz & Co., Chicago, Ill. The sale has been confirmed by the referee in bankruptcy. For the purchasing price the Winternitz Company received stock of material, finished and unfinished cars and chassis, having a total value of \$161,546; factory equipment, tools, jigs, office furniture, etc., valued at \$21,453; patterns, dies, drawings, valued at \$2500; 10 cars and trucks used by the Krit Company, valued at \$3375; equity in buildings, land and in land contracts covering the premises on which the Krit Company is located, valued at \$15,000; stocks of parts, tools, supplies, office furniture and fixtures located in the Philadelphia branch, valued at \$6561.

A deposit of \$12,000 was made by the Winternitz Company, and a bond of \$25,000 was given to guarantee good faith. It was agreed that the total amount of \$120,000, if paid within 90 days, would be subject to a discount of 2½ per cent., or \$3000.

F. BAVEREY TELLS OF WAR.

In a recent letter from the battle ground of Europe, F. Baverey, prominent in the affairs of the four allied factories of the Zenith Carburetor

Company, writes of the struggle and the part the motor vehicle is playing. He states that in France and in England, both Zenith factories are greatly handicapped through the loss by enlistment of their more experienced workmen, but the production goes steadily forward and war orders for England and France have precedence. This leaves the company's Detroit factory the only one working under normal conditions.

Mons. Baverey, who with Mons. Kreps, has the honor of reading a paper on his invention in carburetion before the French Academy of Science, was called to the colors when mobilization was ordered.

He is a captain in the siege artillery of the French forces, an arm of the service which has not been called upon up to the present time. In writing to the Zenith Company in this country, Mons. Baverey says: "The motor truck and the automobile are going through the acid test as



Mons. Baverey, identified with the Zenith Carburetor Company.

never before. Efficiency of petrol, tires or motor cars are forgotten items so long as the vehicle delivers its load of ammunition food, or troops at its destination on time. The carburetor is called upon to handle every available grade of fuel in all kinds of weather and haste in filling tanks means dirt and possible trouble at critical moments. Our carburetor, with its non-adjustable features and ability to use different fuels, is showing up well. Every driver of war vehicles is familiar with its operation through previous experience, which helps a lot".

BIGGERS WITH HYATT ROLLER.

W. E. Biggers, formerly associated with the Packard and Ford automobile companies, has joined the Hyatt Roller Bearing Company, Detroit, Mich., in the capacity of advertising manager. While Mr. Biggers will have his headquarters at the Detroit office of the company, he will spend a great deal of his time travelling, for the purpose of getting in close touch with the many automobile companies using the Hyatt quiet bearing and the Hyatt service stations throughout the country to further the company's publicity.

Mr. Biggers, although but a young man, has had a wide experience in the automobile world. Upon the conclusion of his work at the University of Michigan he accepted a position with the Packard Motor Car Company, Detroit, Mich., acting as assistant to the office manager. Later he joined the sales department of the Ford Motor Company, Detroit, Mich., remaining there until he joined the Hyatt Company.

PAIGE INAUGURATES SELLING PLAN.

The Paige-Detroit Motor Car Company, Detroit, Mich., has inaugurated a prize competition, which represents what is stated to be the first real thorough-going educational campaign in salesmanship and business administration ever developed by an automobile concern. The purpose is to make all Paige men throughout the world thoroughly proficient as salesmen and business men, train them so that returns will be larger, both for themselves and the factory, give them new ideas and new thoughts, get them out of ruts they have fallen into, and make every man something more than a mere order taker, if he has not advanced beyond that stage. The company has offered several valuable prizes in gold, for which it is expected more than 1000 Paige men will compete.

OLDSMOBILE TRIO MANAGEMENT.

The progress of the Olds Motor Works, Lansing, Mich., since the establishment of the trio system of management, April, 1913, shows the efficiency of such an administration. Under this management the responsibility for the affairs of the company is vested in an executive and manufacturing committee composed of D. F. Edwards, comptroller; J. V. Hall, sales manager, and E. Ver Linden, factory manager. The duties usually assigned to a general manager are as-

sumed by the committee and its united action determines matters of general policy.

Among the advantages of this method of management is that all members of the executive committee have equal responsibility in the conduct of the business and have opportunity to make recommendations for its improvement.

SMITH VOLUNTARY BANKRUPT.

Harold O. Smith, president of the Premier Motor Manufacturing Company, Indianapolis, Ind., now in the hands of a receiver, has filed a voluntary petition in bankruptcy. Mr. Smith places his liabilities at \$142,319 and his assets at \$122,584. He claims the statutory exemption of \$600. Of the liabilities, \$80,982 represents creditors holding Premier first and second series of preferred and common stock, owned by him, as security. Mr. Smith's assets include the following Premier stock, the amount being the par value: 301.5 shares of common, \$30,150; 127 shares first series preferred stock, \$12,700, and 785.8 shares second series preferred stock, \$75,580.

BRISCOE GETS CUTTING PLANTS.

The Briscoe Motor Company, Jackson, Mich., has secured the plants and equipment of the Cutting Motor Car Company, that city, under a one-year lease, with privilege to purchase. The Cutting plants have been taken pending the erection of the Briscoe factory that is intended to make possible a trebling of the company's output for 1916, and this will supplement the two plants already crowded with Briscoe production work.

It is stated that in two weeks assembling, painting and trimming will be begun at the Cutting factories and 300 men will be added to the payroll to start with, after which the factory organization will be greatly increased, according to present plans.

GOODYEAR TAKES MOTZ SALESMEN.

Since the Goodyear Tire and Rubber Company, Akron, O., has taken over the sale of Motz cushion tires, there has been considerable speculation as to the future activities of salesmen widely known in the trade under the former Motz organization. The following Motz salesmen have become members of the regular sales force, specializing on Motz tires: J. V. Harding, headquarters at Detroit; H. E. Harding, E. F. Thompson and F. B. Hesse, headquarters at

Akron; W. F. Meyer, R. O. Brinker and V. E. Wagstaff, headquarters at Chicago.

DELCO HAS RECORD TWO WEEKS.

The Dayton Engineering Laboratories Company, Dayton, O., maker of the well known Delco products, announces that it has just completed the largest two weeks in the history of the company. February, it says, promises to be a banner month, and the company thanks its employees for the part they have taken in the work. It says: "A record, of course, is only a mark set to be beaten, a pace set to show you how much faster you will have to go to beat it. Presently, perhaps, we will break another record. But in the meantime, we may be allowed some satisfaction out of what has been done".

WARD LEONARD DROPS DEAD.

H. Ward Leonard, founder of the Ward Leonard Electric Company, Bronxville, N. Y., and inventor and manufacturer of electrical appliances, died suddenly at the Hotel Astor, New York City, Feb. 18, at the age of 54. Mr. Leonard was at the Hotel Astor to attend the annual dinner of the Institute of Electrical Engineers, and as he removed his coat he complained of tightness about the temple. Almost instantly he lost consciousness and died at the Roosevelt hospital shortly after from a stroke of apoplexy. Mr. Leonard was a fellow of the American Institute of Engineers. He had invented mechanism for battleship turrets and ammunition hoists, among numerous other things.

AUTOCAR COMPANY OFFICERS.

The Autocar Company, Ardmore, Penn., at its annual meeting, re-elected its board of directors. Walter W. Norton, for the past several years superintendent of the factory, was elected a vice president and will hold the position of production manager. The officers of the company who were re-elected include: David S. Ludlum, president; John S. Clarke, vice president; Louis S. Clarke, vice president; Edwin A. Fitts, secretary and treasurer; Frank C. Lewin, assistant secretary and treasurer.

HANCH MADE ERSKINE'S ASSISTANT.

C. C. Hanch, who resigned from the Nordyke & Marmon Company, Indianapolis, Ind., to join the Studebaker Corporation, Detroit, Mich., has

been made assistant to A. R. Erskine, first vice president and treasurer of that concern. This is an executive position and includes Mr. Hanch's participation in the official councils of the company and membership on the finance committee.

VINCENT SUCCEEDS WALDON.

The Packard Motor Car Company, Detroit, Mich., announces that Sidney D. Waldon has severed his connection with it after long and valued service. Jesse G. Vincent has been appointed as vice president for engineering, to succeed Mr. Waldon.

FISK EXPECTS RECORD YEAR.

The Fisk Tire and Rubber Company, Chicopee Falls, Mass., expects increased business as the result of the recent lifting of the rubber embargo. G. A. Ludington, superintendent, states that his year will be a busy one for the company.

F. & H. COMPANY CHANGES CITY.

The F. & H. Wire Wheel Company, Columbus, O., is moving its plant to Springfield, O., in order to provide for the increased manufacturing facilities desired. The company anticipates increasing its product as the result of added space.

McGIEHAN OUT OF MOTZ COMPANY.

T. H. McGiehan, vice president and general manager of the Motz Tire and Rubber Company, has resigned his position, effective March 1, to go into the rubber supply business in New Orleans. He will represent several tire and sundries manufacturers.

STEVENS-DURYEA MAY RESUME.

According to an unconfirmed report, the Stevens-Duryea Company, Chicopee Falls, Mass., may resume operations in the near future. This concern suspended the manufacturing of automobiles a month ago for an indefinite period.

PROSPERITY AHEAD SAYS MOON.

Joseph W. Moon, president of the Moon Motor Car Company, St. Louis, Mo., has completed a rather extensive study of the conditions throughout the United States, and he predicts

that the automobile industry, as well as the implement business and similar lines, will have in 1915 the biggest year for a considerable time. Mr. Moon says: "My belief is based principally on the fact that with the unprecedented prices farm products will bring during the next 12 months, even should peace in Europe be declared, there is no question but what, if the farmer gets even one-half a crop, he will be taken care of as he never was before.

"It is true that a large number of western farmers received these prices last year, but it must be remembered that the entire country was surfeited with cotton, which could not be moved, while for the coming year the cotton crop will be replaced to a very large extent with grain. The automobile business throughout the winter, as a whole, has held up remarkably well, especially with those cars which have been in demand in the northern wheat states where prosperity abounds. To give you an idea, the sales of our cars show an increase of \$76,633 this winter over the same period last year".

SMITH HEADS ORGANIZATION.

Frank E. Smith, head of the Premier Motor Manufacturing Company, Indianapolis, Ind., has been elected president of the Indiana Automobile Manufacturers' Association. Mr. Smith was the original president of this organization, and had charge of the first tour made by it through Indiana, Illinois, Missouri and Iowa.

Henry Campbell of the Stutz Motor Car Company is treasurer of the association and Joseph Ward of the United States Tire Company is continued as secretary. The organization is in good financial condition. The members reduced the number of directors from nine to three, the three executive officers being chosen as directors for the coming year. The newly elected officers will shortly devise a plan for the continuation of national interest in Hoosier automobile and accessory manufacturers.

REED-PRENTICE PLANT BUSY.

The Reed-Prentice Company, Worcester, Mass., machine tool manufacturer, is working day and night as the result of large orders secured through the European war. The company now employs about 1000 men, 800 of whom are working days, and 200, nights. Included in recent orders received are a number for the new automatic lathe, originally designed for the Ford Motor Company and afterward made a standard

product. The type has been found perfectly adapted to the requirements of shrapnel shell manufacturers.

BROOKLYN COMPANY SEEKS NEW SITE.

The Automobile Supply Manufacturing Company, Brooklyn, N. Y., is seeking a site on the New Jersey side and will remove its plant as soon as a suitable location is found. The decision is due to litigation in the New York courts, which, according to the president and treasurer, Louis Rubes, has been the outcome of suits affecting the manufacture of the company's chief product, an automobile horn.

NELSON WANTS FEDERAL AID.

Lyman K. Nelson, chairman of the Maine State highway commission, favors federal aid for roads in the Pine Tree state. Mr. Nelson points out the potential need of good roads in Maine as part of the national defense. Maine having an enormous foreign border and long coast line, and being part of the United States nearest Europe, is likely to be the first state to be invaded in case of war, he maintains.

AUTOMOBILE CLUB GROWING.

Arthur Fifoot, secretary of the Automobile Club of Hartford, Hartford, Conn., states that he procured 40 new members through the work carried on at the recent automobile show in that city. The club maintained a booth at the exhibition and the work was productive in every sense of the word.

DORT'S MANHATTAN DEALER.

The Dort Motor Car Company, Flint, Mich., announces that it has appointed Kenton Harmon, 1790 Broadway, New York City, as Metropolitan district manager for Dort cars.

The Magnus Company, Detroit, Mich., has been organized to take over the business of the National Fulton Brass Manufacturing Company, and will continue the brass casting and foundry business of that concern. The capital stock of the new company is \$100,000 and about 150 men are employed.

T. L. Marshall has been elected treasurer of the Marion Motor Company, Indianapolis, Ind.

NEW ACCESSORIES FOR THE MOTORIST.

SCHRADER DUST CAP.

Removed and Fitted by Slight Turn, Saving Considerable Time.

A Schrader's Sons, Inc., Brooklyn, N. Y., is placing on the market a new form of dust cap for tire valves, one



that is quickly and easily attached and detached. One of the desirable qualities of the new cap is that considerable time is saved when fitting a new inner tube to the casing.

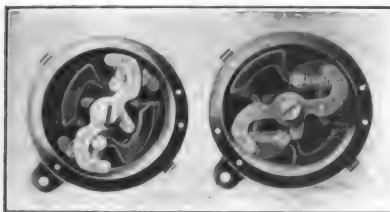
The new cap is slipped over the valve stem, and a quarter turn locks it securely into position. It is displaced by a similar movement. As may be noted by the accompanying illustration, the design eliminates the work of screwing the cap down the entire length of the valve stem. The locking device consists of a thread made in four sections. By pressing the dust cap against the rim nut, the sections contract into one continuous thread, which is given a quarter turn, as stated.

AUTOMATIC SPARK ADVANCE.

Atwater Kent Ignition System Relieves Operator of Manual Labor.

The Atwater Kent Manufacturing Works, Philadelphia, Penn., is producing, in addition to its conventional ignition apparatus, an equipment termed the type K-2, which provides for automatic advance of the spark. The new system is particularly adapted to high-speed motors, and among its advantages is that the spark is supplied proportionately to motor speeds up to 2400 revolutions a minute.

The automatic advance feature is obtained by a governor shown in the accompanying illustration, the view at the left outlining the device in the retard position, that at the right the maximum advance. The device consists of a pair of carefully balanced weights, so controlled by springs as to exert an increasingly direct pull as the weights move outward. These weights tend to move outward or expand as the speed of the motor increases, rotating the shaft to which they are attached and the distributor through a maximum of 38 degrees with respect to the driving shaft,



which is equivalent to 76 degrees of crank travel. Another feature of the Atwater Kent system is that in the event the switch lever is left at the "On" position, the battery cannot discharge, as the circuit is automatically opened by the breaker mechanism.

HALLADAY TILTING WHEEL.

Special Design for the Ford Car and Easily Operated.

The L. P. Halladay Company, Streator, Ill., manufacturer of specialties for the Ford automobile, has brought out an adjustable steering wheel for this machine. As may be noted by the accompanying illustration, which shows the wheel in a tilted position, the device is of decided convenience when entering and leaving the driver's seat.

The adjustable wheel is instantly and easily operated, and locks automatically in its normal position. It can be attached in a few minutes by



any owner, the work involving the removal of the nut on the top of the steering column and fitting the new wheel. The Halladay wheel comes in a black japan finish and with a 14 or 16-inch spider as desired. The spider only may be obtained, and a corrugated rim is supplied at a cost of \$1 extra.

BOSTON SHOW ACCESSORIES.

The accessory department of the Boston Automobile Show, which will be opened March 6, will be large and unusually complete, and in it will be shown practically every late production that will make for convenience, comfort and satisfaction in motor vehicle operation. The majority of the exhibits will be made by representatives of manufacturers who realize the selling possibilities of the show and who will make displays of all that is best in accessories, equipment and supplies. These will be extremely attractive to all visitors and will be well worth seeing. The accessory department will be in the galleries of Grand and Machinery halls and Paul Revere hall.

BELL GREASE GUN.

Is a Modification of the Bell Plunger Used in Tire Pumps.

The Bell Pump Company, Detroit, Mich., is manufacturing a combination oil and grease gun which is a



modification of the Bell plunger utilized in tire pumps made by this concern. The leather plunger is cup shaped and is secured to the plunger rod, and below the leather is a disc having bevelled outer edges. This fits inside the leather cup and is secured to it by a spring. Above the main cup is another in a reversed position.

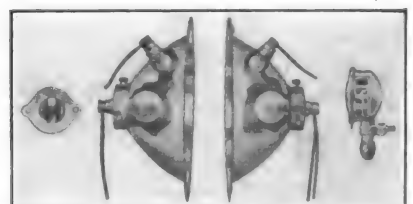
When the plunger is moved downward the pressure of the lubricant forces the disc against the cup, causing the latter to adhere closely to the walls of the gun, preventing leakage when light oil is being used. On the up stroke the spring acts to force the metal disc against the leather member, causing the last named to adhere closely to the walls, preventing leakage. The reversed leather plunger also assists in making the gun air tight. It is stated that heavy greases may be drawn easily into the gun.

NEW C-S FORD HEADLIGHTS.

Have Two Sets of Bulbs, the Smaller Affording Dimming Feature.

The Culver-Stearns Manufacturing Company, Worcester, Mass., has brought out a combination lighting outfit for the model T Ford automobile that is of particular interest to the owners of this machine who utilize the current of the flywheel magneto for lighting purposes in that means are included for conforming to the laws requiring the use of non-dazzling headlights.

The Culver-Stearns lamps have both large and small bulbs, as may be noted by the accompanying illustration. The large members are supplied with current by the magneto while dry cells are used for the small bulbs and the tail light. A five-point switch controls all lamps. The material and workmanship are in keeping with the high grade maintained by this company, and the lamps may be obtained without the tail light or dimming bulb feature.



PRACTICAL EQUIPMENT AND SUPPLIES.

NOVEL CIGAR LIGHTER.

Current Is Automatically Switched On or Off in Its Operation.

The Electric Automatic Cigar Lighter Company, 556 West 27th street, New York City, is making an



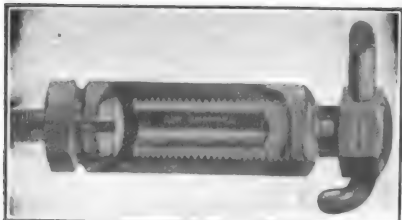
electric cigar lighter which is not only neat in appearance and very compact, but differs from the conventional types in that the current is automatically switched on and off. When use of the lighter is desired the cord is pulled out, which cuts in the current. Upon releasing the cord it automatically winds up and shuts off the supply of electricity. The device may be operated from the lighting circuit or batteries, and comes in nickel, brass or black finish. Special enamel colors are supplied to match those of the car.

STRICKLER GREASE GUN.

Adapted to High Pressure for Removing Hard Lubricants.

The Power Sales Company, 1212 Peerless Gas building, Chicago, Ill., is offering a novel form of grease gun in the Strickler shown in the accompanying illustration. The Strickler is termed a high-pressure grease gun and is particularly designed for lubricating components of the chassis that are not easily accessible with the ordinary types of guns. By this is meant that lubricant with the Strickler can be forced to places like spring bolts, etc., and similarly it is claimed that the ordinary lubricating cup employing hard grease can be cleaned. It is stated that a pressure of 900 pounds to the square inch can be exerted without injury to the gun.

The device consists of a hexagonal steel barrel chambered internally and threaded to take a steel plunger. This



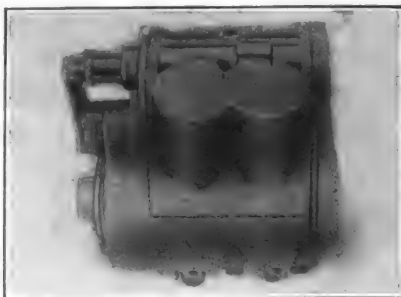
plunger is carefully heat treated. The lower end of the barrel member is threaded internally to take nozzles which are threaded on their outer end to screw or fit on to grease cup openings. The nozzles are made to fit all standard openings, and special sizes will be supplied at a slight extra cost. The standard guns are furnished with an $\frac{1}{4}$ -inch pipe thread nozzle. A complete set of nozzles is not expensive.

PERFECT MOTOR STARTER.

Can Be Employed as a Starter, Motor or for Inflating Tires.

The Motor-Compressor Company, 30 Halsey street, Newark, N. J., is manufacturing the Perfect motor starter, which differs from the usual types of engines employing compressed air in that the device may be employed as a starter, motor or as a compressor. The Perfect is a single unit design.

The starting and compressing are controlled by air pressure, being regulated by the master valve, in which are the starter and the compressor button. By giving the compressor button a half turn and attaching a hose to a suitable connection in the



master valve, air may be obtained for inflating tires, etc. The operation is controlled by a button.

It is stated that the Perfect may be installed on any motor, either under the hood or in front of the radiator, and may be driven from the crankshaft of the engine at motor speed by means of silent chain, shaft or gearing. The piping consists of two $\frac{3}{8}$ -inch and one $\frac{3}{16}$ -inch copper tubes leading from the starter to the master valve, and one $\frac{3}{8}$ -inch tube leads from the master valve to the tank.

SEND PRODUCTION DATA.

Manufacturers of motor vehicle accessories, equipment, supplies or specialties, or their selling representatives, are invited to send to The Automobile Journal catalogues, literature and data, from which descriptions can be prepared for publication. The better purpose is served by having photographs or cuts accompany the information, which will insure satisfactory illustration of the publicity given.

PORTAGE NON-SKID TIRE.

Has Daisy Tread and Is Made in Conventional Sizes and Types.

The Portage Rubber Company, Akron, O., is manufacturing the Portage tires, the non-skid type of which is



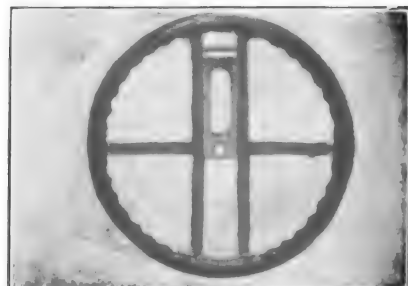
noticeable for its Daisy tread. The maker states that the design provides numerous angles and edges in every direction, and that the hollows or depressions are vacuum creating, affording a sure grip on the road surface.

It is also claimed that the air passages between the "daisies" allow the air currents to circulate, keeping the tire cool. The Portage tires are made in conventional sizes and types. The Portage Rubber Company specializes in an extra heavy inner tube.

"MAROOM" STEERING WHEEL.

Can Be Moved Forward, Affording Easy Exit from the Seat.

A. G. Neville, Schumacher building, Wheeling, W. Va., has patented the Neville "Maroom" steering wheel shown herewith, which enables a driver to enter and leave the seat easily. The spider of the wheel contains a sliding section, permitting the wheel to be moved forward away from the operator, affording nine inches of additional space. The wheel is released from its normal position by pressing a spring latch which locks the wheel in the driving and dislodged position. The spider is of aluminum and the rim of walnut. These are built for all types of cars, with a special design for the Fords.



NEW AND PROPOSED MOTORING LAWS.

THIS is the open season for law makers, and the legislative woods are filled with minor and important measures that are of more or less benefit or harm to the motorist. In Ohio the automobile owners and chauffeurs are fighting as a unit to defeat the measure which provides for the licensing of all drivers of motor cars, whether they are owners or hired drivers, and no member of the family of an owner is permitted to drive the car unless he or she is licensed, and such members will have to pass an examination in order to secure a license. Likewise, should this bill be carried, no person under 18 years of age will be permitted to drive a car on the public highways of the state. Under the provisions of the Ohio act chauffeurs are divided into two classes, those who drive and make repairs and those who drive only; chauffeurs of the first class must make an average of 80 and those of the second grade an average of 60 in the examination. The penalty for any person employing an unlicensed chauffeur would be \$25, and anyone operating a car without a license would be liable to a fine of \$100 and 90 days' imprisonment.

California Making Road Changes.

Nothing very drastic is being done in California, the majority of the bills introduced at Sacramento having road amendments for the theme of legislation. All of the principal bills to date seek to solve the unsatisfactory road administration conditions in the various counties. One bill seeks to abolish road districts and road district funds, creating one central fund, directed by a county highway engineer, who would be chosen from the county board of supervisors in conjunction with the state board of engineers. Another bill in California proposes similar operation of highways, with the exception that the county surveyor shall be the road engineer, save in such counties that are too large for one person to satisfactorily fill both positions.

Tennessee Wants Extended Courtesies.

An act "to provide for the extension of courtesy to automobile owners of other states extending like courtesies to automobile owners who have complied with the laws of Tennessee, so as to permit the operation of automobiles which have complied with the legal requirements of other states, within the State of Tennessee for two weeks, without necessity of registration and numbering", has been introduced in the Tennessee state legislature.

Missouri After Lawbreakers.

Missouri is getting after lawbreakers vigorously, and the present proposed change will prohibit the erasure of numbers and manufacturer's brands from cars and accessories. Another change calls for the muzzling of exhausts, regulating the sounding of signals in villages, towns and cities, and in addition the bill would regulate the licenses charged by municipalities, fixing the maximum that may be levied at not exceeding 50 per cent. of the state registration tax. The bill further requires the opening of branch registration offices in St. Louis and Kansas City for the convenience of owners in these cities, which have more than two-fifths of the motor vehicles owned in the state.

In St. Louis four bills have been introduced that have to deal with the regulation of the automobile. One measure prohibits dazzling lights and specifies the exact distance a direct ray of light is permitted to be thrown. Another bill requires the use of mufflers and prohibits muffler cut-outs; a third states that dense smoke must not be emitted from any motor vehicle, and the fourth seeks to eliminate unnecessary noises, providing that no horn or other noise-making apparatus shall be sounded except as a warning signal to pedestrians or to attract the attention of a traffic policeman.

Texas Out for Registration.

Tired of seeing other states waxing fat on motor registration receipts, Texas is framing up a bill providing for the state registration of automobiles and motorcycles, and the payment of a license fee varying with the horsepower of the motor vehicle which would bring the state a revenue of fully \$500,000 a year. With the exception of the disposition of the proceeds from registration, the measure is identical with the New Mexico law, which is said to have proved entirely successful. The new law will tax all vehicles except traction engines, road rollers, fire wagons, ambulances and vehicles run only on rails. Every automobile owner must register his machine annually with the secretary of state, and the fees will be as follows: For less than 12 horsepower, \$2; 12 horsepower and less than 20, \$4; 20 horsepower and less than 30, \$6; 30 horsepower and less than 40, \$8; 40 horsepower and less than 50, \$10; 50 horsepower or more, \$12. The law provides for a dealer's license fee of \$12 a year.

This law would not apply to non-residents

until their machines had remained in the state for 60 days or more. The enactment of this law will abolish the county motor tax, but would permit cities and towns to require owners of cars to register their state numbers, and to charge them a fee of 50 cents annually.

New Motor Tax Bill in Michigan.

A motor tax bill has been introduced in the Michigan house of representatives, providing for an additional tax of 25 cents a horsepower; also a tax of 25 cents for every 100 pounds of weight. This new bill is to replace the act of 1913, which was declared invalid by the Michigan supreme court. The reason for adding a tax on the weight of motor cars is the fact that many low-powered cars are much heavier than high-powered machines, and the latter do not wear out the roads as much as the former. This, it is said, will provide a more equitable taxation, and trucks and other commercial vehicles will have to pay a more just proportion, considering that they wear the roads more than the passenger cars.

Massachusetts Has Road Changes.

The Massachusetts highway commission is endeavoring to secure a uniform highway act, and in its report to the legislature asks for the following changes in the law: For the licensing of motorcycle operators; for the passage of a statute to provide uniform penalties for the operators of all motor vehicles; for the definition of the words "chauffeur" and "dealer"; for authority for the commission to make the road improvements it deems best; and for power to suspend the right of any resident of the state to operate automobiles.

New Hampshire Amends Laws.

A new method of a single tax on pleasure automobiles has been introduced in the New Hampshire legislature. The new law makes the registration fees payable to the secretary of state, and takes the place of both the present license and tax. The fees are: Not exceeding 15 horsepower, \$5; not exceeding 25 horsepower, \$10; not exceeding 40 horsepower, \$20; not exceeding 50 horsepower, \$25, and exceeding 50 horsepower, \$40.

No other fee or tax is to be collected of any automobile, except the operator's license. One-fourth of the money collected by the secretary of state is to be turned over to each town or city where the motor vehicles are owned. Likewise, a law has been introduced in New Hampshire to compel all motor vehicles to stop just short of a railroad crossing. This law is considered entirely too drastic, as it is pointed out that hundreds of machines entering and leaving Nashua

on a Sunday would have to stop at the Acton tracks, despite the fact that there is no train service on Sundays and very few trains throughout the week. Another New Hampshire law that is termed drastic by the motorists of that state, reads: "The driver of any motor vehicle approaching or passing a car on a street railway which has been stopped to allow passengers to alight or embark, shall slow down such a vehicle and if necessary for the safety of the public shall bring such vehicle to a full stop. Upon approaching a pedestrian who is upon a travelled portion of the highway, and not upon a sidewalk, such vehicle shall be slowed down, and a timely signal shall be given with the bell, horn or device for signalling".

Delaware Seeks Many Law Changes.

A number of bills have been introduced in the Delaware legislature seeking to amend the motor law. The proposed changes call for the revocation of the license of an operator who is convicted of operating the machine while under the influence of liquor, the same to be certified to the secretary of state by any mayor, justice of the peace or the judge of the municipal court of Wilmington. In this way the various convictions will be noted, and on the third offense the operator's license will be revoked. Another section of the proposed law requires business cars of non-resident owners regularly using the roads of the state to carry Delaware license tags. The court has held that under the present law this is not necessary except where the cars are engaged in business within the state.

A separate bill will be introduced authorizing the governor to appoint at his discretion an automobile inspector for each county during certain seasons of the year, the inspectors to be used to enforce the motor vehicle statutes and empowered to make arrests. They will be appointed from month to month and will receive \$50 for each month of actual service and railroad fare.

Maine Has Important Legislation.

The most important bill to be presented to the Maine legislature is that calling for the entire operation of the automobile registration law in the hands of the state highway department, which will completely eliminate the secretary of state in respect to motor car fees. The state highway commission favors the plan and it is stated that the move would be for the better enforcement of the law at less cost.

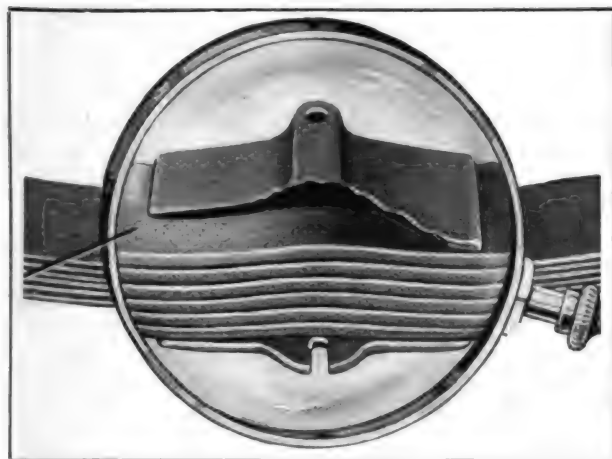
At the present time the various state legislatures are considering these bills, and their disposition is anxiously awaited by motorists throughout the country.

U-SAV-YOUR TIRE REMOVER.

The U-Sav-Your tire remover is the product of the U-Sav-Your Manufacturing Company, Warren, Mass., and is a practical little device for displacing tires from the rim. The tool is attached at two points to the demountable rim, and when the handle is operated or pulled over, the rim is contracted, permitting of easy removal of the tire. The company also markets a liquid automobile dressing for removing grease or stains.

UNBREAKABLE SPRINGS.

A motor vehicle spring that is guaranteed against breakage is being produced by the Tuthill Spring Company, 776 Polk street, Chicago, Ill. The Tuthill Titanic spring differs from



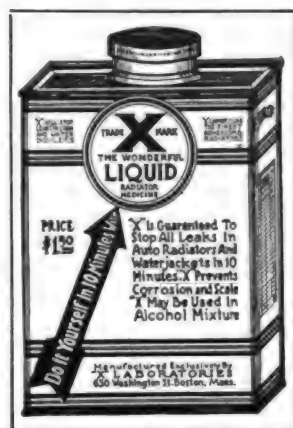
Illustrating Construction of the Tuthill Titanic Springs.

other types in that there is no centre bolt, consequently no hole in the leaves. It is because of this feature that the maker guarantees his product against centre breakage. The construction makes for maximum elasticity, and squeaks are an unknown quantity in the Tuthill design, as the leaves are carefully ground and polished and lubricated with graphite. The method of securing the spring is shown in an accompanying illustration. The company carries in stock springs for all standard makes of motor vehicles and can make a prompt shipment. Special springs will be supplied at short notice. The Tuthill Spring Company will supply complete details.

"X" RADIATOR LIQUID.

A preparation for repairing leaks in radiators, one that differs from the usual compounds in that it is a liquid, is that being manufactured by the "X" Laboratories, room 9, 630 Washington

street, Boston, Mass. One of the features of the preparation is that it will mix readily with an anti-freezing solution. A desirable quality is that it may be left in the radiator, and will automatically repair any leak that may develop. The maker states that his preparation prevents the forming of scale, and that it improves the efficiency of the cooling system. One can of the "X" liquid is sufficient for two ordinary sized radiators.



"X" Liquid for Radiators.

DEALERS IN SOCIAL SESSION.

The Lowell Automobile Dealers' Association, Lowell, Mass., recently held its annual banquet at the Richardson hotel, that city. Those present were: M. D. Brown, president; T. L. Williston, treasurer; M. F. Feindel, secretary; Joseph Marren, P. N. Cossette, D. A. Mackenzie, Stephen Rochette, Harry Pitts and Milo Hale.

NOVEL REPAIR PLUG.

A novel and practical method of repairing punctures of the inner tube is noted in the Sampson plug, marketed by Stevens & Co., 373 Broadway, New York City. The plug is made in two sections and after inserting in the inner tube the sections are drawn together by means of a wire. This wire is screwed up tight and broken off. This makes possible the rapid mending of a puncture without the use of cement, etc., and the shape of the Sampson plug is such that it does not depress the tube. Tests made with the plug show that it is exceedingly durable. The complete equipment comes in a neat case and includes a special tool for preparing the tube for the plug.

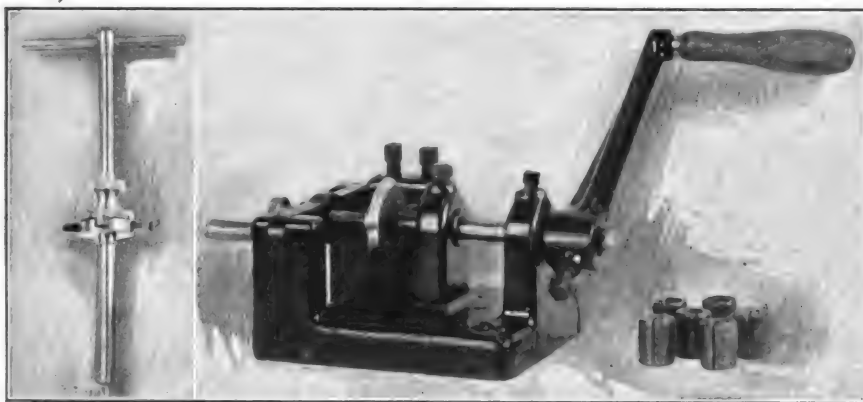


Showing Simplicity of Sampson Repair Plug and How It Is Fitted to Tube.

AMERICAN VALVE TOOLS.

The American Valve Tool Company, Stamford, Conn., is marketing the American adjustable valve seating and valve facing tools, shown in the accompanying illustrations. The maker states that the seat refacing tool can be adjusted to any size valve seat in less than 30 seconds, and that a few turns will obtain a perfect seat. The tool is supplied with four different size pilot stems to fit the different size valve leads, an arrangement making possible the trueing of eccentric valve seats. The American valve tool is made in two sizes and will repair all types of valves from the motorcycle size to the largest used in the motor vehicle.

The refacing tool is a valuable addition to the garage and repair shop, as it is quickly and easily adjusted to any size valve stem, as well as to any diameter valve. The tool can be permanently at-



The American Adjustable Valve Seating and Facing Tools.

tached to the work bench, screwed or clamped to the wall, and with it valves may be refaced accurately in record time. Details and prices of the American tools will be supplied upon request.

BIG MEN BUY 1915 WINTONS.

That the 1915 Winton cars, made by the Winton Motor Car Company, Cleveland, O., are proving big sellers is plainly evident by the recent purchases throughout the country. A partial list of the most prominent buyers includes:

J. H. Hustis, Jr., president Boston and Maine railroad, Boston; L. C. Waldo, president White Star line, Detroit; W. V. Miller, president National Transit Company, Oil City; Eugene Levering, president National Bank of Commerce, Baltimore; Frank A. Arter, capitalist, Cleveland; F. V. Wishart, manager Hotel Astor, New York; George M. Lovejoy, vice president Phoenix Insurance Company, Hartford; A. H. Turrill, state superintendent of banks, St. Paul; Spencer Hsley, vice president Marshall & Hsley

bank, Milwaukee; C. C. Vernam, Ainslee's Magazine, New York; J. A. Gregg, president Nichols, Dean & Gregg, St. Paul; James A. Robertson, of the James Robertson Company, Ltd., Montreal; D. H. Wilson, Jr., consulting engineer Erie railroad, New York; Edmund Mitchell, vice president Wilmington Gas Company, Wilmington; Senator Carroll D. Benson, Baltimore; D. F. Crawford, superintendent of motive power Pennsylvania railroad, Pittsburgh; C. S. Maddock, pottery, Trenton; W. S. Jones, business manager Minneapolis Journal, Minneapolis; M. B. Moon, vice president First and Old National bank, Detroit; D. C. Moon, general manager New York Central railroad west of Buffalo, Cleveland.

ELECTRIC MEN HONOR F. W. SMITH.

The officers and directors of the Electric Vehicle Association of America, New York City, gave a dinner at Delmonico's recently to their past president, Frank W. Smith, in appreciation of the tremendous amount of work he accomplished during his term. The dinner was a surprise to Mr. Smith, and at its conclusion an address was made by John F. Gilchrist, of the Commonwealth Edison Company, Chicago, Ill., who succeeds Mr. Smith as president. During this address a series of lantern slides illustrating Mr. Smith at different stages of his life were flashed upon a screen.

After his response to this Mr. Smith was handed a letter from Thomas A. Edison regretting his absence from the dinner, and a copy of this was projected upon the screen. Among those present were: Past President Frank

W. Smith, President John F. Gilchrist, Vice President W. H. Johnson, J. W. Lieb, Day Baker, W. H. Blood, Jr., Charles H. Miles, L. D. Gibbs, E. S. Miles, J. A. Hunnewell, Harvey Robinson, A. Jackson Marshall, H. M. Edwards, W. P. Kennedy, Arthur Williams, James H. McGraw, W. H. Onken, H. C. Cushing, Jr., F. W. Frueauff, P. D. Wagoner, R. L. Lloyd, W. G. Bee, W. C. Andrews, J. W. Brennan, J. F. Becker, C. D. Marsh, A. L. Salts, T. A. Carter and T. E. Murray.

MAXWELL HAS INDIANAPOLIS AGENCY

The Maxwell Motor Corporation, which handles the Maxwell cars in Indiana, has opened headquarters at 541 North Capitol avenue, Indianapolis. In addition to the sales rooms, a fully equipped service station will be maintained.

PYRENE CUTS INSURANCE BILLS.

For the motorist who sees economy in saving \$15 on every \$100, the Pyrene fire extinguisher should be of special interest. This saving can be made on insurance, as the various companies have granted a 15 per cent. reduction to any motorist who has a Pyrene equipped car. The Pyrene Company of New England, 88 Broad street, Boston, Mass., offers an extinguisher that is approved by the National Board of Fire Underwriters, and the efficiency of its product has been fully demonstrated in hundreds of cases. Besides protecting the owner of a car that is Pyrene equipped, it safeguards the lives of the occupants of the car, and gives an absolute feeling of surety. Brass and nickel plated extinguishers are offered, and these are light in weight, and require but little space.

**EAGLEINE SOUVENIRS AT BOSTON.**

The Eagle Oil and Supply Company, 104 Broad street, Boston, Mass., will have a very attractive and artistic souvenir to distribute to visitors at its Boston show booth. This year the Eagleine products will be exhibited at booth 541, balcony, during the week of March 6-13, and the motorist will do well to visit this booth. Eagleine No-Karbon oil is too well known to the motorist who buys the best to need description, as it has been used for the past 12 years and has proven its quality, efficiency and economy consistently during that time.

PROVIDENCE FAVORS DIMMING.

The common council, Providence, R. I., on March 1 will report favorably on an amendment to the traffic and vehicle ordinance, requiring that the headlights of all vehicles be dimmed while being operated in streets in the centre of the city at night.

HARRIS OIL MAKING LARGE SALES.

The A. W. Harris Oil Company, Providence, R. I., reports a large spring business in Harris oils and greases. In common with most concerns in the automobile accessory industry, this company is preparing for a record season, as every present indication points to the greatest year in the history of the motor car trade. The

Harris products are made of the finest Pennsylvania premium crude oil, and are refined by a special process which eliminates all carbon and soot producing elements.

ZIMMERSCHIED ON S. A. E. COMMITTEE.

K. W. Zimmerschied, chief metallurgist of the General Motors Company, New York City, has been elected chairman of the standard committee of the Society of Automobile Engineers.

GEORGIA MOTOR 'BUS CONCERN.

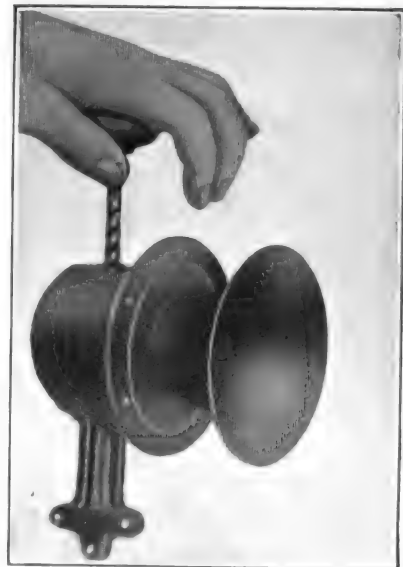
The American Municipal Motors Company, Rome, Ga., has been incorporated to manufacture 'buses.

HECO MECHANICAL HORN.

The Heinze Electric Company, Lowell, Mass., is manufacturing the Heco mechanical auto horn, shown herewith, which does not require any batteries or adjustments. The maker lays emphasis upon the note obtained, stating that it is far reaching in its effect and at the same time is not displeasing to the ear.

The Heco is manually operated. Pressing down a composition handle engages a ratchet clutch, which in turn actuates a rotor consisting of steel hammers. These hammers fly out by centrifugal force, contacting with a steel diaphragm or sounding board. The contact obtains a sharp mechanical sound, which the maker states is entirely different from other types of signals. The hammers strike a series of rapid blows, rather than scrape.

It is stated that the horn will endure indefinitely, as the material is the best that can be procured, and that the parts are carefully assembled. The Heco horn is adapted to all types of motor vehicles.



Illustrating Operation of Heco Horn.

CHATTANOOGA THE CENTRE OF ROADS WORK.

CHATTANOOGA, Tenn., is the centre of the good roads movement which is sweeping the South by storm. This has followed the project of William S. Gilbreath, secretary of the Hoosier Motor Club, Indianapolis, Ind., to establish a Dixie highway from Chicago, Ill., to Jacksonville, Fla. The Chattanooga Automobile Club has followed the lead of the Hoosier secretary and some very definite plans are now under way for real accomplishment. Chattanooga feels that it should be on the main route, as it is the natural gateway between the Middle and Western sections and the South, and also because it is a point where motorists travelling to the

South want to visit Lookout mountain, Missionary ridge, Chickamauga and other spots identified with the Civil war.

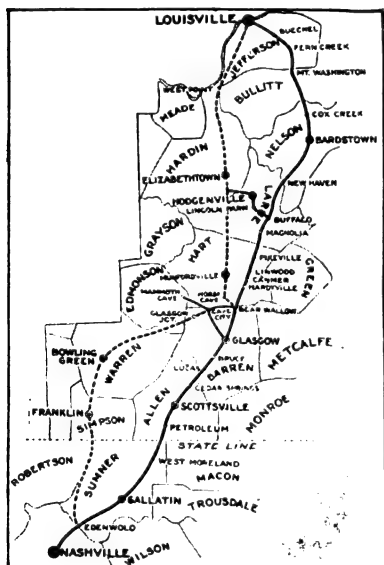
In the map printed on this page, issued by the Louisville Automobile Club, Louisville, Ky., a route between Louisville and Nashville is shown. Regarding this, Dr. R. R. Elmore, president

of the Louisville club, says: "The movement is now under way for the construction of the Dixie highway, an interstate road, to start from Chicago through the states of Indiana, Kentucky, Tennessee, Georgia and Florida, ending at Jacksonville. The importance of such a road, particularly toward developing the South, cannot be overestimated. Backed by the various commercial bodies, motor clubs and the interest which has been manifested in it by the governors of the various states, the success of the project seems well assured."

The black line route traverses the most picturesque scenery, passes the most places of historic interest, has the best grade, is in best condition for repairing, runs through a most populous country, and it is not dangerous. It is the logical link in a great national highway, being the most direct route".

The points of interest included on this route are the home place of George Rogers Clark; Federal hill, where Stephen Foster wrote "Old Kentucky Home"; the grave of John Fitch, who built the first steamboat on the Ohio river; "Fondavera", the old mission house where the exiled king, Louis Phillipe of France lived; Knob creek, where Abraham Lincoln was saved from drowning as a boy and on which his father floated in a flatboat with his family to their Illinois home, after leaving Kentucky; the Lincoln Memorial farm, where can be seen the log cabin in which Lincoln was born; the Mammoth cave, the greatest subterranean wonder of the world, and many other points of historic and immediate interest aside from the scenic beauty of the route.

A meeting of all those concerned will be held April 3 for the adoption of an official route. The route first tentatively selected for consideration of the conference is by the way of Louisville, Ky., Nashville and Chattanooga, Tenn., and Atlanta, Ga. At this meeting the governors of all of the states directly interested will be present, and it was called by Governor Ralston of Indiana, at the instance of the Hoosier Motor Club. It is the hope of the various organizations and business men behind the movement that definite action will be taken, and that actual work will commence as the result of the meeting of the various



Proposed Route Between Louisville and Nashville, on the Dixie Highway.

of the Louisville club, says: "The movement is now under way for the construction of the Dixie highway, an interstate road, to start from Chicago through the states of Indiana, Kentucky, Tennessee, Georgia and Florida, ending at Jacksonville. The importance of such a road, particularly toward developing the South, cannot be overestimated. Backed by the various commercial bodies, motor clubs and the interest which has been manifested in it by the governors of the various states, the success of the project seems well assured."

"Kentucky is fortunate at this time in having a fairly well improved road from Louisville to the Tennessee border, indicated by the heavy

state executives. While the first call was addressed to the governors, they will form only the nucleus of the meeting, as the invitation is being made general to all persons along the projected highway, and good roads enthusiasts all over the country. Correspondence recently received by the Hoosier and Chattanooga automobile clubs indicates that the meeting will be one of the most important and most largely attended good roads conventions ever held in the South, probably second only to the recent good roads congress at Atlanta.

The projected Dixie highway does not involve new construction work for the entire distance between Chicago and Jacksonville as, whichever route is adopted, it will mean that long stretches of existing highways will be embraced. The movement merely calls for ways and means of joining the several existing links and improving all portions of the route that are not in first-class condition. Between Louisville and Nashville there are two roads existing, which were stage coach routes in the olden days. They are of varying character and their value depends largely on weather conditions. From Nashville to Chattanooga a road exists, but it needs a good deal of improvement. From Chattanooga to Atlanta there is a good road, although it leaves something to be desired in certain places.

Since the plan of the Hoosier Motor Club has met with such wide approval, C. E. James of Chattanooga, has come forward with a proposition for another route which, while leaving out Nashville, would shorten the distance between Louisville and Chattanooga very materially. This route would also proceed along the top of Cumberland mountain, a run that would rival anything in the United States for rugged and scenic beauty. Mr. James has promised to contribute \$50,000 toward the construction of the road should this route be chosen. The mountain stretch of what has come to be known as the "James route" would be at a uniform altitude of about 2000 feet above the sea level. It is planned to construct a 20-foot roadway with a 10-foot stretch of concrete in the centre.

This proposed highway is clearly shown in the map on this page and what would be a part of the Cumberland Mountain route has been already provided, through construction a few years ago of a fine boulevard from Chattanooga to the top of the mountain. This road, about 15 miles long, cost \$100,000 on account of peculiar engineering problems to be overcome, and connects the city with an all-year-round resort on that portion of the mountain range known as Signal

point because of the military operations there in 1861-65.

OHIO MOTOR DEALERS ORGANIZE.

A meeting of the automobile dealers of Ohio was held recently at the Virginia hotel, Columbus, O., for the purpose of forming a state dealers association, to look after the interests of the automobile trade in general in the state. Several hundred dealers were on hand from all parts of the state, many by special invitation from the lo-



The James Route Between Louisville, Ky., and Chattanooga, Tenn., Which Traverses the Cumberland Plateau, Proposed for the Dixie Highway.

cal dealers association and many who visited merely to attend the automobile show at Memorial hall.

At this first meeting a temporary organization was effected and L. M. Browne was elected president and J. P. Gordon, secretary. The following vice presidents were elected: W. S. Barrett, W. Faunce, C. L. Hansberger, C. M. Ross, J. C. McBeth, W. L. Huffman, Mr. Shaner, Mr. Rathburn and J. P. Hoffman.

LAPAN TROUBLE CHART.

FOR the motorist not familiar with faults that may develop with the ignition system, the carburetor, clutch, etc., a trouble chart is of

chassis.

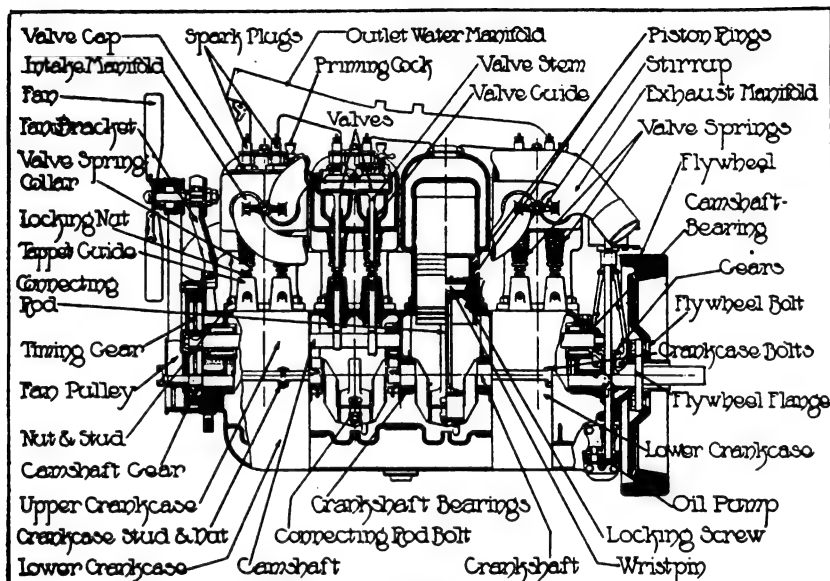
As will be seen, the chart covers the troubles systematically; that is, it gives the causes of certain faulty conditions and shows how one or more components may be responsible. It also shows how to analyze certain symptoms and to locate the parts responsible.

The causes are treated under separate heads, that dealing with the failure of the motor to operate being well defined. Assuming that the motor will not run and the testing of the ignition system reveals no faults, and that the carburetor is suspected of being the offender: Under the head of "carburetor not in working order" will be found listed the probable causes.

Similarly, a test of the spark shows that no flame is obtained at the gap of any of the plugs.

With the battery and coil system the trouble may be due to a number of causes which are described, and those which might affect the magneto are also given.

For the assistance of the motorist not convers-



Longitudinal Sectional View of a Conventional Power Plant with Components Lettered.

value. Frank A. Lapan, Pawtucket, R. I., has submitted the trouble chart reproduced herewith, and as may be noted it outlines the causes and effects of faulty operation of the power plant, as well as deals with other components of the

The
motor
runs
normally

The clutch works normally

The clutch sticks at a particular speed

The clutch sticks at all speeds

The clutch will not work at all

Change speed lever, no trouble indicates

Change speed lever indicates an impediment

Shift lever (sheared key on live axles, differential spider broken, broken drive shaft, sheared key on same, broken bevelled gear, twisted or misaligned drive shaft (evident), broken universal joint.
Chain drive (loose sprocket, sheared key or jackshaft, etc., similar to the above).

Broken or mutilated gears.
Broken ball bearings.
Sticking or misalignment of sliding gear shafts, or of their operating mechanism.
Deformed gears, loose operating mechanism, interior faults varying with different models.

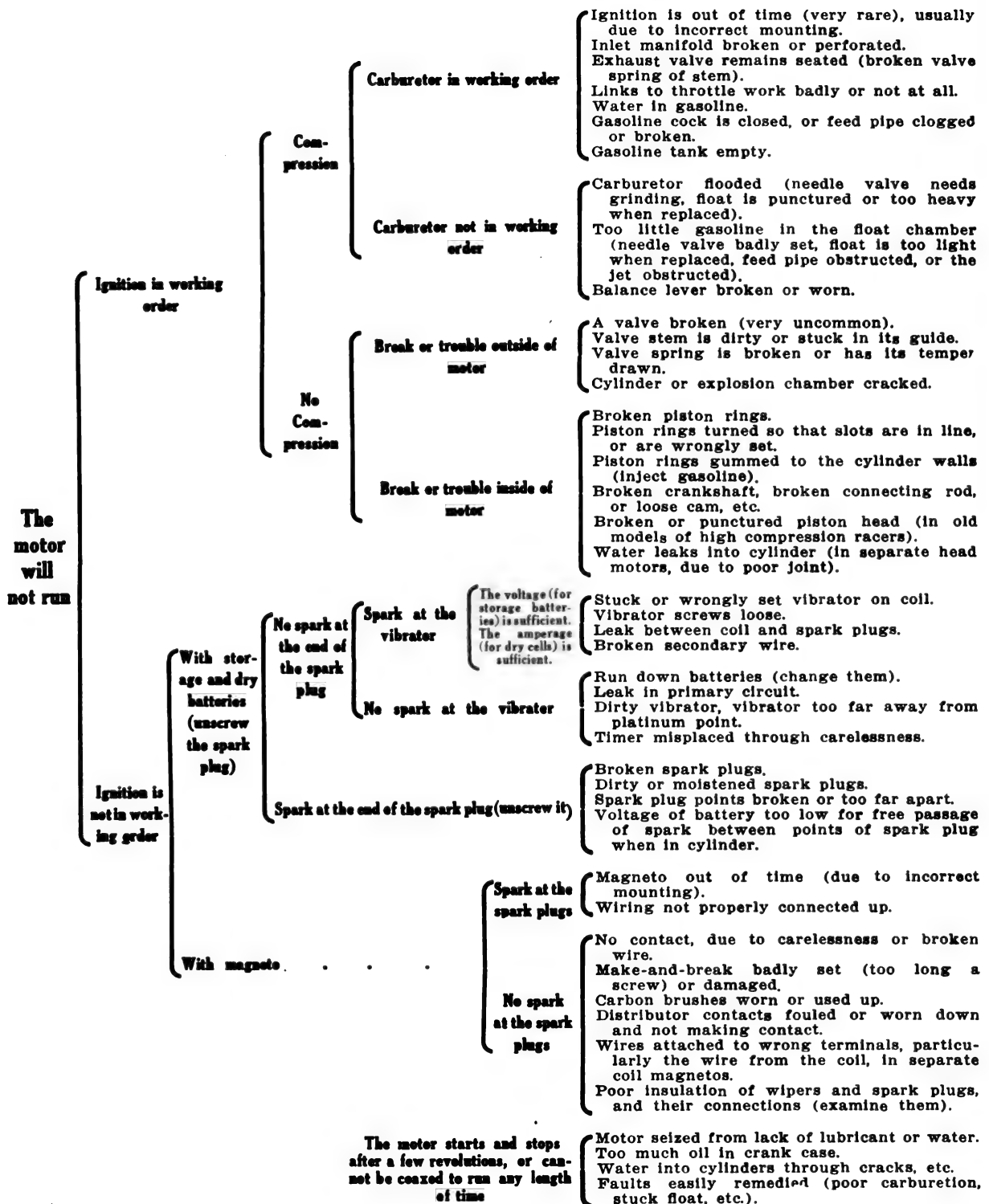
Teeth broken in corresponding pinions.

Misalignment of transmission shafts, seized bearings and cages, foreign bodies between gear teeth.
Dragging brakes, due to carelessness or improper adjustment.

Broken or weakened spring.
Damaged leather, shaft out of line, or bent, plates or discs buckled, sheared keys.
Seized shaft, leather plates or discs "frozen" or gummed.

ant with the components of the motor and their location, the accompanying sectional view of an engine will be of service. Each part is lettered,

and a little study will enable one to become familiar with the mechanism, the troubles of which are listed in the chart.



CORRESPONDENCE WITH THE READER.

Shimming Bearings—Reader, Knoxville, Tenn.

How are ball bearings fitted with shims adjusted when the bearings become loose?

With some types of gear boxes and axles the bearings are shim adjusted. A number of thin washers of sheet brass may be interposed between the

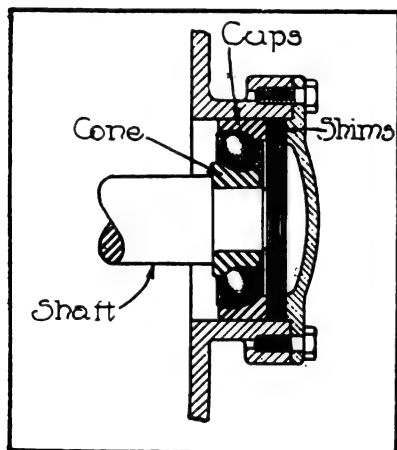


Fig. 1—Shimming Ball Bearings.

the shims should be kept together and tagged for future identification to insure that the adjustment made at the factory be maintained in the reassembly. If the bearings be loose, add thin shims about .005-inch thick to the others until there is no appreciable lost motion and yet no binding between the bearing parts.

Flywheel Markings—Curiosity, Syracuse, N. Y.

Please explain briefly the markings on the flywheel of a motor, what they mean and how they are utilized.

The markings of the flywheel of the motor are of value in determining the opening and closing points of the valves, and generally the dead centres are indicated. The markings are utilized for a number of purposes, among which may be named the correcting and checking of the valve openings, the setting of the magneto or timer, etc.

By referring to Fig. 2, which shows a flywheel with the markings, it will be seen that figures are utilized. For example: I O 1-4, denotes the opening points of the intake valve of the first and fourth cylinders and I C 1-4, their closing points. Similarly E O and E C denote the opening and closing points of the exhaust members.

The method of utilizing the indicating marks is simple. For example, if it be desired to check the openings of the valves, the flywheel is ro-

tated in its normal direction until the mark I O 1-4 comes opposite the arrow or pointer on the upper part of the crank case or cylinder. With the marks registering, the inlet of the first or fourth cylinder, counting that nearest the radiator as the No. 1, should begin to lift or open. If not the timing is late, and should be corrected. This is accomplished by loosening the locking nut of the valve tappet and raising the latter, increasing its length. It should be so adjusted that the valve starts to lift when the flywheel marks register with the pointer as previously explained. The other valves are checked in a similar manner, and care should be taken to tighten the lock nut securely.

G. P. O. Spring—R. F., Billerica, Mass.

Will you kindly give me the address of the maker of the G. P. O. supplementary spring described and illustrated in your issue of Jan. 10?

The spring in question is marketed by Fenestre, Cadisch & Co., 171 Great Portland street, London, W., England.

Motor Knocks—A. M., Burlington, Vt.

I have a Regal car equipped with a Michigan magneto and when going up a hill if I retard my spark the engine will knock. I have tried cutting down and increasing the fuel, but it does the same thing. There is no carbon in the cylinders. Do you think the trouble is due to the magneto or the spark plugs?

The symptoms described do not indicate ignition trouble. If the knock is a dull one and is more noticeable when the motor is pulling hard and running slowly, the trouble is more likely to be loose main bearings. If the knock be a sharp one and more noticeable at high motor

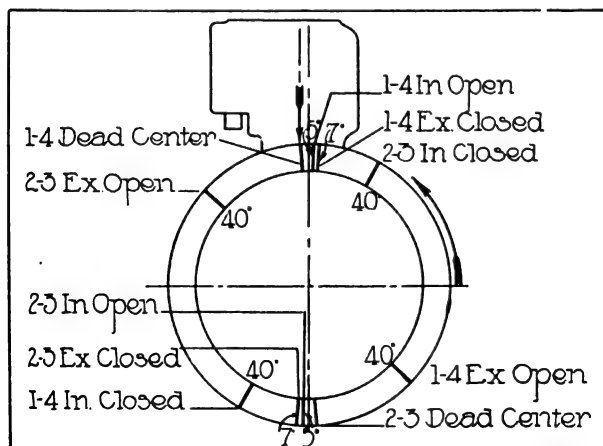


Fig. 2—Illustrating Use of Flywheel Markings in Timing Opening and Closing Points of the Valves.

speeds, it is generally due to a loose connecting rod.

It is advisable to inspect the bearings for lost motion, and at the same time note if there be excessive end play of the crankshaft or camshaft. The wristpins should be carefully tested, as sometimes a loose pin coming in contact with the cylinder wall is productive of a dull knock. By going over these parts, it is probable that the cause of the noise will be readily located.

Recharging Magnets—C. E. C., Battle Creek, Mich.

Will you kindly inform me through your columns how to recharge the magnets of a model T Ford?

While it is possible to recharge the magnetos referred to, the writer is of the opinion that more satisfactory results would be obtained by securing new magnets from the factory. A complete set is not expensive, and new members will obtain the results desired. The maker of the car recommends installing new magnets.

Connecting Rods—R. G. A., Providence, R. I.

Being a subscriber of your magazine I am taking the liberty of asking you the following questions, and trust that you will make a reply in the next issue. I am overhauling the motor of my car and find that the connecting rod bearings are very loose, and as there are several shims in each rod I would like to know which is proper, to take out a shim or to scrape in the bearings?

It may be necessary to do both. Generally, if the bearing is in good condition, lost motion can be eliminated by taking out one or more shims. The bearing should be carefully examined, also the crankpin, and if either are scored, they should be trued up. Ordinarily, if the surfaces are in good condition the displacing of the shims will suffice. The bearings may be tested by using Prussian blue. Any high spots should be scraped so that an even bearing will be obtained.

Licenses—Reader, Boston.

To settle a dispute will you please state what signs like B 8585 and O 8585 refer to, and are they the same in every state? What does a regular chauffeur have to do to change his license if he goes from one state to Pennsylvania and works over one year in that state? How do you distinguish the cylinder types?

The letters and numbers referred to indicate that the cars to which they are attached are licensed as commercial, manufacturer and dealer, the O indicating the manufacturer and dealer. A similar method is employed in other states; that is, the agents' and makers' machines bear a license or number plate with a letter preceding or following the numbers.

A chauffeur residing in Massachusetts and desiring to take up employment in Pennsylvania is required to take out a driver's license. The fee

is \$2 and the license is good for one year from the date of issue.

The different types of cylinders are distinguished by their shape. For example: With the L head the valves are all on one side and the cylinder has the appearance of an inverted letter L, hence the name.

The T head construction has valves on both sides of the cylinder and the head is T shaped. The Knight sliding valve sleeve motor is an example of the I design.

Hard Starting—J. J. M., Pawtucket, R. I.

I have a model 38 Overland which is very hard to start even when you spin the motor. The engine hasn't any life. I have put in new batteries and new plugs and used new gaskets all around. The plugs give a good spark when placed on the cylinders, and they work all right in another motor. The timing is correct and all connections are tight. The machine never gave me any trouble before. I have not operated it, however, since last August. Will you advise as to the trouble? I have been a subscriber to your book for the past two years.

If the timing is correct and the spark is good, and other components of the motor in order, it may be assumed that trouble exists with the fuel supply. It may be that the spraying nozzle of the carburetor is clogged or that water is present. Flush the carburetor, then drain its contents. Next open the needle valve and spin the motor without any spark. Readjust the needle valve and with the switch on, try starting. If the motor has stood for some time, it may be that one or more of the valves are not seating. This may be determined by trying the compression.

Faulty Coil—Ignition, Newport, R. I.

I have a two-cylinder car and use dry cells and a two-unit coil for ignition. One of the units has been giving me considerable trouble. No matter how I adjust the vibrator the coil works erratically. I have gone over all the connections and still it gives bother. The spark is weak when it does spark. What is the trouble and how can it be remedied?

Either the windings or the condenser are broken down. The coil should be sent to the manufacturer for repairs.

DES MOINES ASSOCIATION ELECTS.

All the officers of the Des Moines, Ia., automobile show association were re-elected at the recent meeting of directors. They are: Dean Scholer, president; W. W. Sears, vice president; C. G. Van Vliet, secretary, and C. L. Herring, treasurer. The details of the coming automobile show, March 8-15, were considered by the directors, but no action was taken otherwise than to indorse the show committee for the work already done.



PROSPERITY.

That the automobile industry is entering an era of prosperity is evidenced by the statistics compiled by The Automobile Journal and presented elsewhere in this issue. When it is considered that the total estimated production of motor vehicles in the United States will be approximately 750,000 pleasure cars, commercial vehicles, etc., and that this is in excess of last year's output by nearly 200,000, it will be readily seen that the automobile industry is enjoying prosperity. Those who cried calamity when the European conflict broke out, will find food for thought in the statistics previously referred to. The Middle West is enjoying exceptional prosperity, thanks to the bumper crops, and a general revival of the business is noted in the East. The year 1915 should go down in history as one of prosperity for the automobile industry.

FAVORS DOUBLING TAXES.

Two members of the general assembly of a New England state have gone on record as favoring doubling the taxes now imposed on automobilists. And strangely enough, both of these

legislators state that they own and operate automobiles. One of these gentlemen says that he is willing to pay an increased tax for the privilege of driving over good roads. It is proposed to include all types of motor cars, but no mention is made of horse drawn vehicles. The incident is another practical demonstration of class legislation.

REHASHING THE LAWS.

The various legislatures are busy grinding out new laws in their endeavor to improve motor-ing conditions. Delaware has modified its laws, and the speed limits in that state are now 15 miles an hour in closely built up sections and 25 miles an hour in the country. The reciprocity clause is also more liberal. Other states, however, appear to be curtailing the privileges enjoyed by visitors. The legislators of these states are considering only the state's treasury.

THE BOSTON SHOW.

As in the past the Boston show, which occurs March 6-13, will equal any of the national events. It is the only big show of the year at which may be seen the commercial motor vehicle, and for this reason it offers the business man an opportunity to combine business with pleasure. Indications point to a record breaking attendance, and if the Chicago and New York shows may be taken as a criterion, a record volume of business should be transacted at Boston.

DIMMING LAWS PREVALENT.

A large number of cities have passed laws forbidding the use of glaring headlights, and many others are considering ways and means of regulating the use of lights. Insofar as the cities are concerned no motorist will object to the laws, but the regulation of the headlights on the country roads is an altogether different problem for, until some genius invents a device to eliminate the glaring rays of both the electrically and gas lighted car, without sacrificing the efficiency of the lamps, the enactment of a practical bill is beyond the legislators.

MOTOR STARTING SYSTEMS FOR 1915.

**Motors Are Lighter, More Efficient, and Components Are Readily Accessible—
Majority of Makers Favor Flywheel for Transmitting Energy of Starter.**

FEW radical changes are noted in the motor starter employed with the 1915 pleasure motor vehicle. Improvements, however, have been made in the designs and details are refined. The efforts of the manufacturer of the motor starter have been towards lighter weight, simplicity and accessibility. Weight, however, has not been reduced at the expense of efficiency; in fact, the smaller and more compact units are more efficient than some of the larger designs employed on last season's cars.

Of particular interest is the entrance of several magneto manufacturers into the motor starter field during the past year.



Starting Is Made Easy.

This is largely due to the tendency towards employing the ignition, lighting and motor starting equipment of one maker, the advocates of the equipment stating that the owner is benefited thereby in that the various units can be cared for by the one service station. Well known magneto makers who now market lighting and motor starting equipment, include the Splitdorf Electrical Company, the Bosch Magneto Company, the Remy Electric Company and the Simms Magneto Company. The product of these concerns is standard on a large number of 1915 cars.

A review of the motor starting equipment reveals a diversity of opinion as to the method of imparting the energy of the motor to the engine, as well as to its use separately, with the light-

ing generator or a combination of the two units. For simplification in the discussion of the systems employed, they will be divided into three general classes, these being the one, two and three-unit systems.

The three-unit system may be defined as one including a separate motor starter, generator and magneto, and utilizing the storage battery as a source of current supply, although there are some systems in which the ignition is entirely separate, as with the true high-tension magneto, for example.

The two-unit system is one in which the function of ignition, starting and lighting is cared for by two units, one supplying ignition and current for lighting or charging the battery, and the other providing for starting. Generally the dynamo is fitted with a timer-distributor and coil. There is another form of two-unit system. This is a motor-generator with the ignition member a magneto. The combination may be a separate

generator and motor mounted in one frame or tandem fashion, or placed one above the other, a double-deck arrangement. With these designs each member has a separate armature and field.

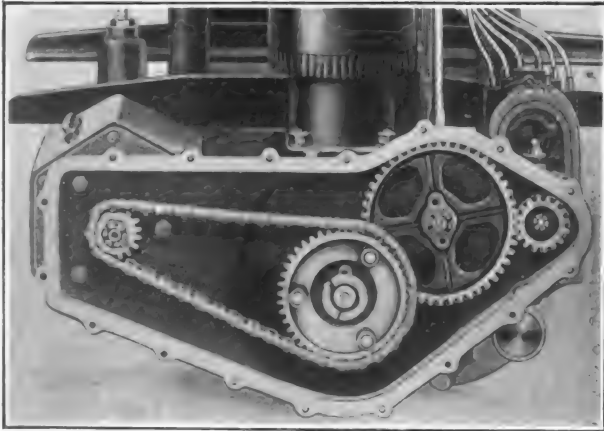
Another method is the



Convenient Control on White Car.



Starting Pedal on the Allen Is in Toeboard.



Illustrating the Use of the Silent Chain for Transmitting Energy of the Motor Starter to Crankshaft of the Engine.

motor-generator, a single unit, one having but one armature and the one field. The armature carries two windings and there are two sets of brushes and commutators. When functioning as a dynamo the unit is driven by the engine, and when operating as a motor starter, it is energized by the current supplied by the battery.

The single-unit system is one in which the motor, dynamo and ignition are cared for by the one unit. Generally these take the form of the motor-generator and include a timer-distributor and induction coil for intensifying the low-tension current supplied both by the generator and the battery.

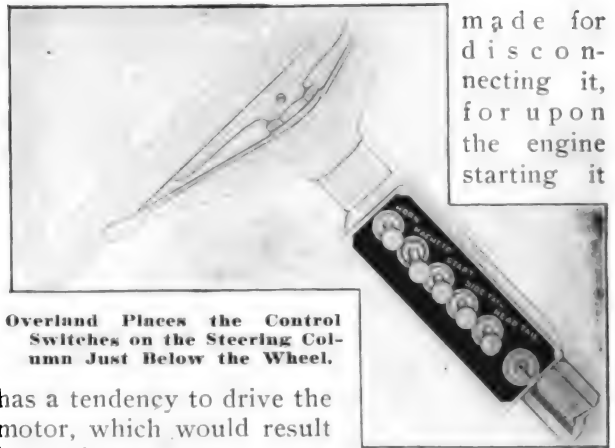
The motors are generally series wound; that is, the fields are in series with the battery instead of being parallel as with the shunt wound types. It is claimed that the series wound motor affords a higher turning effort, especially at low

cranking speeds.

An inspection of the various installations of the motor starter shows a considerable difference, as does the method of applying the energy of the unit to the engine. This is largely due to the space available; that is, the room provided by the designer of the engine. There are three general methods of applying the power of the electric motor: By a moving pinion that meshes with teeth cut on the periphery of the flywheel of the engine, by a silent chain or a gear to the front end of the crankshaft, or by a shaft through the timing gears. In addition to these may be named the use of the transmission gears.

The method of disconnecting the driving member of the motor starter from the engine varies, but with all types it is necessary that provi-

sion be made for disconnecting it, for upon the engine starting it

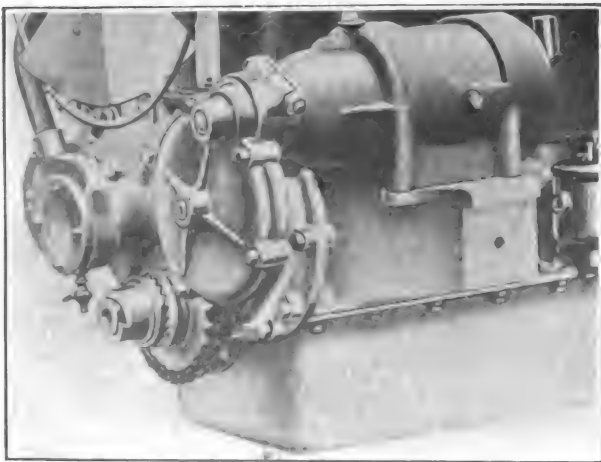


Overland Places the Control Switches on the Steering Column Just Below the Wheel.

has a tendency to drive the motor, which would result in heating the motor, if not burning it out. The devices employed consist of an over-running clutch, spiral gear or an electrically operated pinion.

Examples of the over-running clutch are shown in accompanying illustrations, and one of these is shown disassembled. Use is made of two reduction gears, a large and very small one, and these drive a sprocket carrying a roller chain, which transmits the drive to the crankshaft of the engine. The sprocket operates through an over-running clutch on the crankshaft, and the function of this clutch is to permit the sprockets, chain, etc., to remain stationary, except when starting the engine.

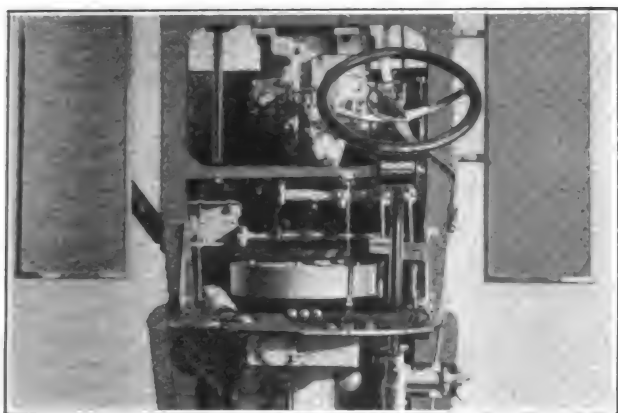
The clutch consists of a drop forged hub, in which is inserted a hardened steel ring. Within this ring, and revolving on a bushing around the crankshaft, is a steel spider, to which is bolted the larger sprocket. This sprocket is driven by the motor through the chain. Located equidistant on the spider are three recesses, in which



Showing the Over-Running Clutch and Silent Chain Drive Employed on the Haynes.

are fitted wedge shaped pawls. The outer or larger end of these pawls practically conforms in shape to the radius of the steel ring in the clutch hub, and bears against the inner side of the ring. When starting, these pawls bear against the ring at such an angle as to cause them to grip it firmly. When the engine starts, the pawls automatically release, due to the fact that the crankshaft rotates at a higher rate of speed than does the sprocket.

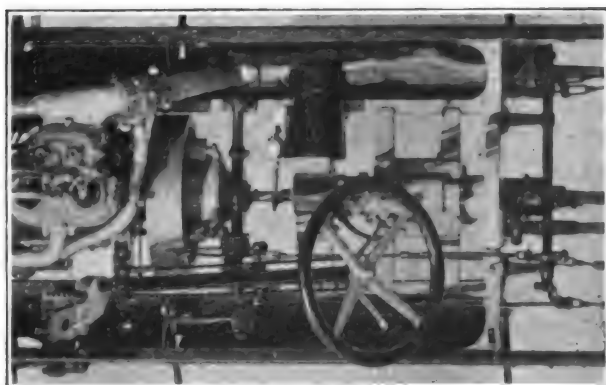
The Bendix or spiral gear drive is generally employed with the flywheel gear arrangement. It practically comprises a pinion mounted on a helical shaft extension of the armature of the motor starter. The pinion has a disc attached to it and a weight on one side. When the starting switch is closed the tendency of the helical shaft is to revolve, but this is checked by the inertia of the disc attached to the pinion. As a result the pinion and shaft are prevented from rotating too freely.



The Energy of the Motor Starter on the White Is Applied by Silent Chain.

and the gear is drawn in by the helical shaft until it is fully meshed with the teeth on the flywheel. With the starting of the engine, its effort to drive the motor armature results in unscrewing the pinion on the shaft and throwing it out of mesh.

One of the more recent developments in the flywheel type of starter is the magnetic shift for engaging the pinion with the teeth of the flywheel. When the motor is to be started the ignition switch is closed and a button on the dash pressed. An electrical current moves the pinion into mesh and, upon the engine starting, another current is cut in, drawing the pinion back to its normal position. Another equipment includes similar means, the pinion and armature of the motor sliding back and forth to obtain engagement and disengagement of the pinion with the teeth of the flywheel.

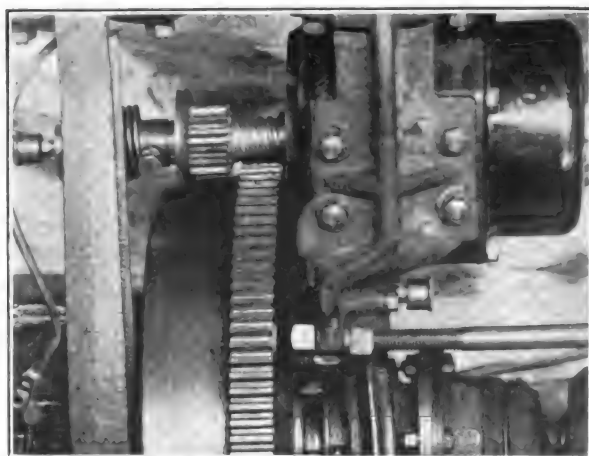


The Motor Starter on the Reo Is Mounted at the Front of the Gearset and Drives the Engine Through Worm Gearing—The Clutch Is Engaged When Starting Is Desired.

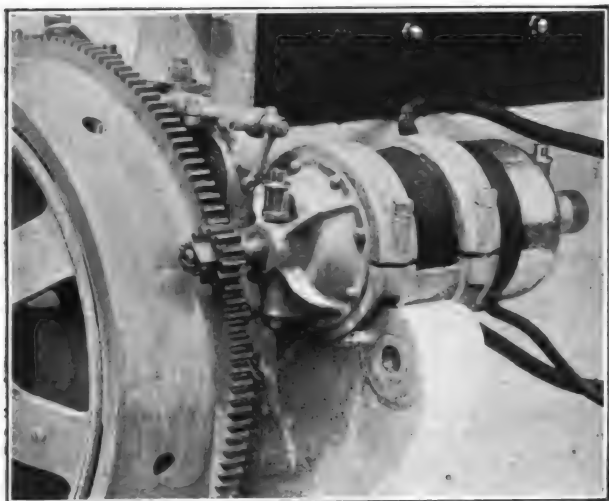
For the benefit of those not familiar with the electric motor starter, and who do not understand how so small a motor can rotate the crankshaft of a gasoline engine at a considerable higher rate of speed than is possible by manual cranking, the reduction between the motor and the crankshaft or flywheel will be explained.

With the flywheel method the pinion on the armature shaft of the motor has a very small number of teeth compared with those on the periphery of the flywheel. Consequently, the pinion will make many revolutions to one of the flywheel before the latter completes a revolution. The shaft of the motor starter may revolve from three to 30 times as rapidly as the crankshaft of the engine, and these reductions may be augmented further on the crankshaft.

The cranking speeds of the various systems vary, some units rotating the crankshaft of the engine at a rate of speed as high as 250 revolutions a minute and as low as 104. The speed va-



Illustrating the Bendix Method of Meshing the Pinion of the Motor Starter Used on the Chevrolet.

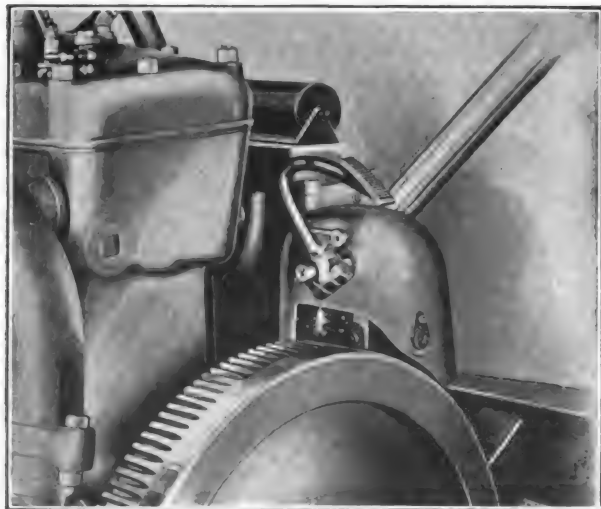


Showing the Single-Unit Type of Starter on the Marmon and Flywheel Gear.

ries with the number of cylinders, the bore and the stroke, and as a rule the crankshafts of the smaller engines are rotated at a much higher rate of speed than the larger power plants.

The draw or current consumed from the storage battery energizing the motor starter varies considerably, generally ranging from 65 to 110 amperes, although one instance is noted where 225 amperes are necessary for an instant, as when overcoming the resistance in starting.

Six and 12-volt starting systems are utilized, the manufacturer producing both to meet the requirements of the car manufacturer. Some systems provide for a 12-volt current when starting and charge the battery as a six-volt member. The cells are connected in series to obtain the required voltage, either six or 12, and after the en-

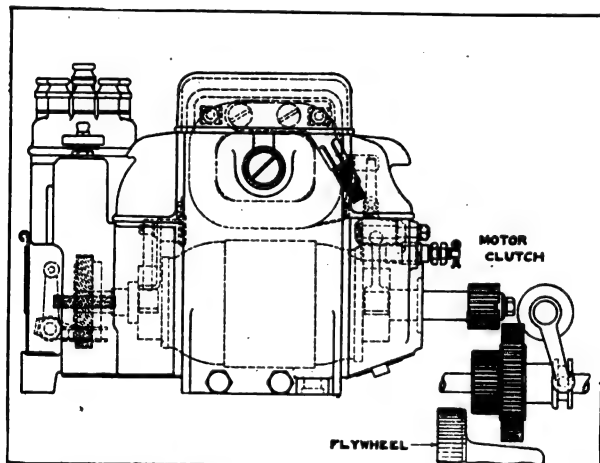


Control Pedal and Motor Starter of the Cartercar.

gine has started the battery supplies current for six-volt lighting or ignition.

The control of the motor starter, that is, the member cutting in the current from the battery is generally a starting button, which is usually located in the floor board and operated by a pressure of the foot. Some makers place the control unit in the toeboard, while others mount it on the instrument board or dash.

A departure from conventional practise is noted in the White and Overland cars. The starting and lighting switches of the former are contained in a small, compact cylinder mounted just below the steering wheel, on the upper side of the column. This location permits the driver to reach them without moving forward, a convenient and accessible control. The control switch of the Overland is mounted in a similar manner, as may be noted in an accompanying illustra-

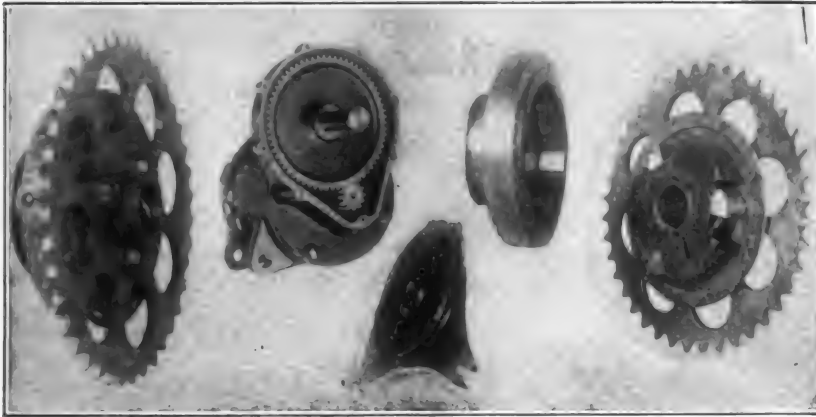


Illustrating the Installation of the Delco System on the Cadillac—The Unit Is a Motor-Generator.

tion, but a heel button or pedal is depressed to complete the operation of starting.

A radical departure in the control of the motor starter is noted in the Fiat. The motor is bolted to the engine base leg directly ahead of the flywheel, and energy is applied through a train of gears, affording a reduction of 24 to 1. The control member is the change speed lever, a small lever on the gearshift tube holding a rod, which operates the switch and the small gear meshing with the teeth on the flywheel.

The maker claims that this arrangement avoids the possibility of operating the starter with the clutch engaged and gears in mesh inasmuch as, when the gearshift lever is in the starter slot of the H plate, which is the outer one, the gears are in neutral, as the lever does not engage with any of the shifter forks. A safety latch is incorporated, as may be noted in an accom-



Showing the Reduction Gears, Sprocket and Over-Running Clutch of the Starter Mechanism on the Studebaker Car.

ppanying illustration showing the installation.

To provide for easy engagement of the pinion of the motor starter with the gear on the flywheel of the engine, the Cadillac makes use of the armature of the motor-generator. Closing the ignition switch causes the armature to rotate very slowly, and this initial rotation permits the pinion to mesh with the flywheel gear. Upon depressing the pedal button the gears are fully meshed, and at the same time the motor-generator functions as a motor, rotating the crankshaft of the engine.

OVERLAND HAS RECORD WEEK.

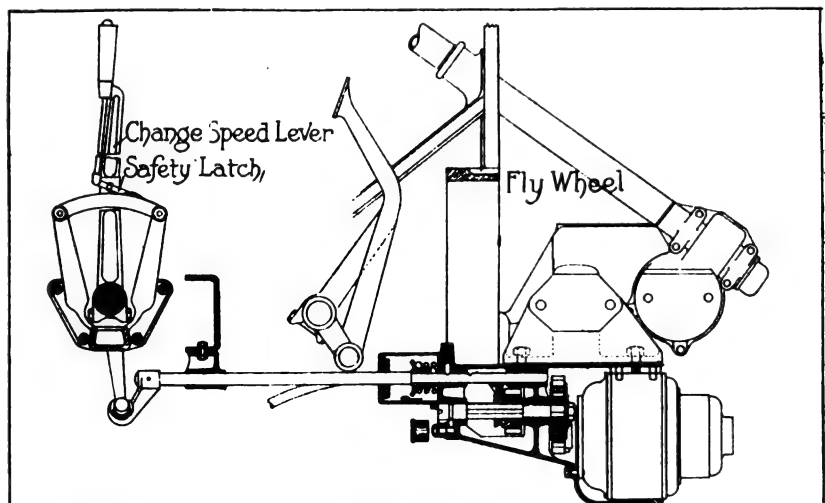
The Willys-Overland Company, Toledo, O., announces that the week ending Feb. 13 was the largest single week the company has ever experienced. This is an excellent indication of the increasing prosperity of American industry, and coming from a concern that ranks as the second largest manufacturer of motor cars in the world, the statement of facts is indicative not only of better business conditions, but of the steadily growing market for motor cars that sell for a medium price.

It is stated that the enormous Overland plant is operating 24 hours a day with a full force of 8600 men. Although the present daily production of Overlands far exceeds that in effect on the corresponding date of last year, the number of cars being built is not sufficient to meet the demand. The unfilled

orders in the hands of the company's sales department on Feb. 6 were larger by 26 per cent. than those on hand at this time last year. Of particular interest are some facts relating to the Overland business in the East, where financial conditions have been reputed to be especially bad. In New York City, 145 per cent. more Overlands have been required to meet the demand since the start of the fiscal year on July 1. In Washington the increase is 125 per cent., in Boston, 110 per cent., and in Philadelphia, 70 per cent.

Additional figures show that Cleveland's increase is 130 per cent., that of Pittsburg 80 per cent., and Toledo 60 per cent. In the Middle West Chicago, which ranks as the third largest of the 4000 Overland dealers, shows a growth in sales of 64 per cent., and Kansas City, the second largest Overland distributing point, is using half again as many cars as it did during the same period of last year. Milwaukee is running one-third ahead of its record of a year ago.

The Overland figures show a surprising volume of good business in the motor world and bear out the statement of business optimists who declare that the recovery from conditions brought about by the declaration of war in Europe is growing stronger every day. In order to provide space for the manufacture of Overland cars needed to meet the demand, a large addition to the plant is being erected.



The Change Speed Lever Is Utilised on the Fiat for Controlling the Operation of the Motor Starter.

ANNOUNCE NEW TYPE OF ZENITH CARBURETOR.

THE progressiveness of the Zenith Carburetor Company, Detroit, Mich., maker of the well known Zenith carburetor, is noted in the an-

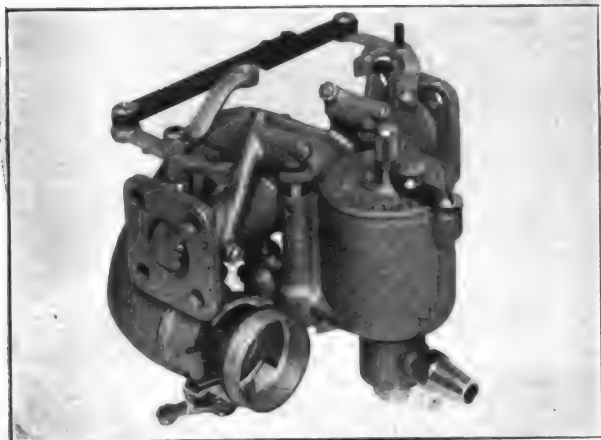


Fig. 1—New Zenith Carburetor Brought Out for Eight-Cylinder V Motors.

nouncement by this concern of a carburetor for the eight-cylinder V type of motor. The new design is similar in construction to the horizontal type brought out about a year ago. In the new model there are two outlets to the intake manifolds, one supplying each bank of four cylinders, and two throttles. The throttles are interconnected, so that the usual throttle and accelerator will act to open or close both simultaneously.

Referring to the illustrations, Fig. 1 is an external view of the device, while sections are shown in Fig. 2. It will be seen that there are two entirely separate and distinct mixing chambers with their jets and throttles, these both being supplied from a float chamber, which, with the float mechanism, is common to both. It might be considered that each is a complete carburetor for four cylinders except that only one float chamber is used, and there is also only one air intake, this supplying both mixing tubes. The mixing chambers are horizontal, with the jets entering the venturi section at right angles, so each outlet attaches to the intake connection without bends.

The main feature of the Zenith carburetor is the combining of an ordinary nozzle with another from which the flow is

independent of the suction of the engine. These two nozzles are concentric, the ordinary nozzle, or main jet M, obtaining its gasoline from the float chamber through the passage C. It is surrounded by the jet J, which is supplied through the passage N from the well. This well is open to the atmosphere and gets a measured flow of gasoline through the compensating hole D, which is not subjected to the suction and has, therefore, a steady flow. The main jet, if used alone, would give a mixture of which the richness would be in proportion to the speed, and therefore the suction. At low speeds the suction is low, and therefore the mixture would be lean and at high speeds when the suction is greater, too rich a mixture would result. To compensate for this the outer jet lends its strong support to the main nozzle at low suction, when it is most needed, and withdraws it gradually as the main nozzle gathers in strength with the increasing suction.

The slow-speed arrangement is also a feature of the Zenith construction. It is composed of the idling tube X, of which the lower end is so sloped as to receive the coned upper end of the idling tube Y. This tube Y can be screwed up into the end of X, more or less, by means of the knurled tube Z. This provides for adjustment of the mixture going through the tube, since air can enter at the base of tube X through holes drilled in adjusting tube Z.

The tube T connects the idling tube X with the carburetor mixing chamber near the throttle, by means of the intervening passage T¹. At starting, the suction at the throttle is very powerful, and fuel is drawn up from the well through the nozzle of Y and idling tube X, at the bottom of which it mixes with air entering through the

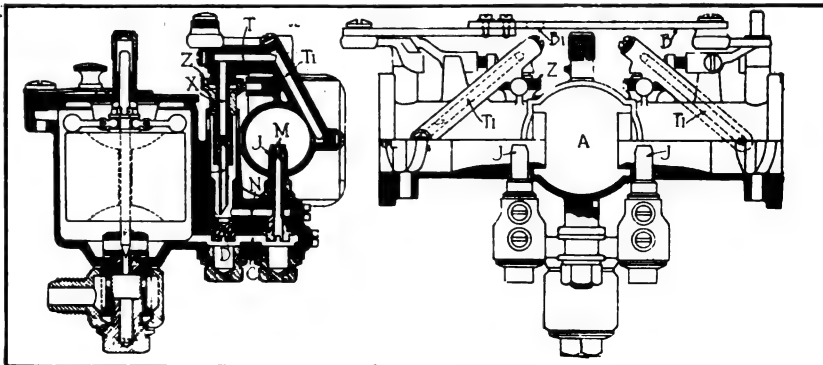


Fig. 2—Longitudinal Sectional View of New Zenith Carburetor at Left; at Right, Illustrating Duplex Mixing Chambers and Dual Jets.

holes in the lower part of Z. The mixture is thereupon atomized, and sprays into the carburetor just behind the throttle and near the end of the mixing chamber. This gives a good starting mixture, and, as the throttle is opened wider, the compound nozzle comes into use and the starting jet goes out of action.

The standard Zenith features of interchangeable nozzles to fit any type of motor, metallic float with overhead float action and removable venturis is retained for the new design. The common air intake is shown at A and the mixing chambers open off it on opposite sides.

The interconnection of the two throttle levers is shown at B, while the hole B¹ provides the means of attachment to the control rods. As the illustrations show, there are two complete sets of compound nozzles, two slow-speed nozzles, and everything which has to do with the vaporization and mixing of the fuel is in duplicate, so that the generation of gas will be in accord with the demands of both sets of cylinders, in the V between which the carburetor is intended to be placed. The horizontal design should prove very convenient in this position.

BAG KANGAROOS FROM OVERLAND.

Hunting kangaroos by motor car is the latest sport reported from Australia. A letter received by the Willys-Overland Company, Toledo, O., contains an interesting description of the unique hunt. The mere chase alone is said to be productive of many thrills, calling for a fast car guided by an adept hand. To pilot a motor car through the open country, over fields dotted with rabbit warrens and bunch grass bunkers, at a speed of 40 or 45 miles an hour, calls for steady nerves, a cool head and consummate skill.

As the shooting is done over the side of the car, the man at the wheel is forced to manoeuvre his craft much after the fashion of a man-o'-war in order to give the rifles a chance. The hunters shoot from a bumping, swaying seat at a target which moves as fast if not faster than the car, and the range varies from 50 to 100 yards. The fact that a prolonged drought had made the kangaroo a pest in the vicinity of watering places, caused the Willys-Overland distributor to offer his services and his cars towards ridding the country of numbers of the troublesome animals. Heretofore it has been found exceedingly difficult to bag the creatures without persistent and expert stalking. Kangaroos will run 45 miles an hour with injuries that would stop a human being in his track, and though

wounded they can easily outdistance the fleetest horse.

An early morning start was made from Adelaide in an Overland car and an Overland speedster, the objective point being the plains some 50 miles distant, where the 'roos had made themselves especially obnoxious to the big ranchers. Each of the cars had a full complement of passengers, all of whom were armed with heavy government army rifles. Twenty-five miles beyond Burra-Burra, the jumping off place of civilization, was sighted a small herd of kangaroos, whose heads plainly showed over the salt bush to the left of the road. The animals took to flight, but stopped at a distance of 300 yards long enough to allow a hunter to wound one of them with a ball from his carbine.

While the others again started their swift flight, the wounded animal took an opposite direction from its fellows and started away at a terrific speed. The speedster turned into a course paralleling that of the kangaroo, bumping over the rough country at a speed never less than 45 miles an hour by the speedometer, without making a perceptible gain. Gradually the driver turned from the parallel course and cut over towards the animal, which, seeing the change of direction, suddenly shifted its course to an angle which would take it directly across the path of the speeding car. The hunters discovered that this was inevitably the method taken by the fleet animals, instead of turning in an opposite direction from that of the car. This gave the hunters the chance they wanted to make their kill, which was accomplished without difficulty.

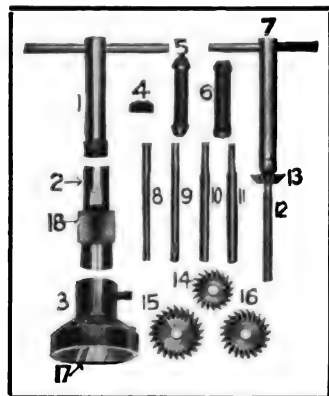
In the course of the morning, 34 kangaroos and an Australian emu were bagged by the two cars. The new sport promises to become popular with Australian hunters.

SAXON HAS RAYFIELD CARBURETOR.

The new Saxon six, made by the Saxon Motor Company, Detroit, Mich., will be equipped with the model G Rayfield carburetor, made by the Findeisen & Kropf Manufacturing Company, Chicago, Ill. This carburetor, which is a water jacketed model, is the highest-priced type made by the Rayfield Company. The Saxon Company has promised the production of at least 10,000 sixes, and is counting upon the Rayfield, not only to bring out perfectly the performance of its really remarkable motor, but to express in a tangible way to the public the quality spirit in which their small car has been built.

NEW TOOLS, SUPPLIES AND EQUIPMENT.

AN IMPROVED machine for reseating valves has been brought out by H. G. Paro, 719 Michigan Boulevard building, Chicago, Ill. The



New Fossnacht Valve Reseater

equipment is most complete, as may be noted by the accompanying illustration, and the maker states that with it valves may be reseated perfectly and quickly in one-quarter the time required by the conventional methods. A desirable quality of the Fossnacht valve tool is that no oil or emery is required, and the operation is a clean one. To obtain perfect results with the reseating tool, one does not have to be an expert, as it is stated that it can be employed successfully by a novice. An advantage of the equipment is that it can be utilized on all types of motors. The Fossnacht occupies but little space in the tool kit and can be easily carried by the workman when he is sent outside to work on motors. Liberal discounts are offered to the trade. A booklet dealing with valves will be sent free upon request.

NEW LITE LIGHTING SYSTEM.

Owners of the model T Ford automobile desiring to equip their cars with a high-grade electric lighting equipment, including a dynamo, will be interested to learn that the New Lite Manufacturing Company, 2400 Newlite building, Newton, O., has perfected a system for this machine.



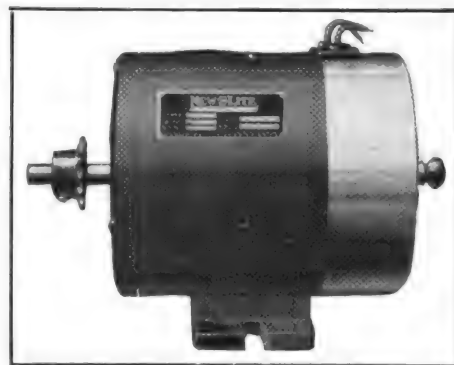
New Lite Dynamo on Ford Car.

This company specializes in electric lighting equipment and after much study and experimentation announced the generator which is shown separately, also installed, in accompanying illustrations

The dynamo is a slow-speed member, rotates on high-grade ball bearings, and drive is taken by silent chain from a special sprocket on the crankshaft of the engine. The attaching of this sprocket does not interfere with the manual cranking of the motor, and the installation can be made easily by the owner. The equipment is complete and includes a cut-out, storage battery, lamps and all parts necessary for installation of the system. The dynamo is of large capacity and is guaranteed as represented.

BOSS CIRCUIT TESTER.

The Maroa Manufacturing Company, Maroa, Ill., is producing the Boss circuit tester for service in testing the circuits of the lighting system of a motor vehicle. The socket in the instrument



Illustrating the New Lite Generator for Ford Motors.

is attached to a 110-volt direct or alternating circuit, and the clip of the device is attached to one end of the cords in the conduit. The other cord tip is held in the left hand. Each cord on the other end of the conduit is touched with the right hand, and the proper one is denoted by a slight tingling sensation in the fingers, but not sufficiently strong enough to be harmful or annoying. The device makes it a simple matter to locate a wire in a conduit as above explained.

PORTABLE CYLINDER GRINDER.

Boxill & Bruel, 112 East Fourth street, Cincinnati, O., is manufacturing the B. & B. portable automobile cylinder grinder, which is designed especially for repair shops and service stations. The equipment was exhibited at the recent Chicago show, where it attracted considerable attention. The grinder is self-contained, and consists of a circular bar with a circular rack integral with it. This is fed through a train of worms around and down at the same time by a

horizontal sleeve, which contains the grinding spindle, and this sleeve is eccentric to the main bar, which permits the boring of cylinders of differing size.

Flexibly coupled to the grinding spindle is a vertical motor, which turns the cutting wheel at a high rate of speed. The electric unit is a 1/10 horsepower horizontal motor, and the 1/6 horsepower vertical motor consumes but little current, making the machine an



The B. & B. Portable Cylinder Grinder.

economical one to operate. Perfect alignment is obtained by a unique method of attaching the grinder to the cylinder. Graduation on the top of the bar affords accurate and sensitive adjustment. Further details and prices will be supplied by addressing the company.

PEERLESS CARBON CLEANER.

The Peerless Motor Specialty Company, New York City, is marketing the Peerless carbon cleaner, which is moderately priced. The equipment generates oxygen gas at low pressure, and includes a box of material called Decarbonite. The recharging is obtained at a slight expense.

GRINDING COMPOUND.

Stewart & Co., 171 Broadway, New York City, is marketing Gryndyn, a valve grinding compound in a new form. The coarse and fine abrasive is packed in one container with tin screw covers and an interior partition.

CURTIS COMPRESSOR.

The Curtis Pneumatic Machinery Company, St. Louis, Mo., is manufacturing a portable type of compressor having a capacity of 250 pounds. The outfit comes equipped with 1/4, 1/2 and one-

horsepower motors, and the equipment is mounted on heavy castors. The outfit is most complete and includes hose, gauge, switch, socket, flexible cord, etc.

LIBERTY BELL.

The Liberty Bell Company, the Arcade, Cleveland, O., is manufacturing a novel electric signal termed the Liberty Bell. Not only does it serve as a signal, but as a warning lamp. Mounted on the top of the bell and fully protected from the elements, is a lamp with a ruby lense, which flashes its rays, as may be noted by the accompanying illustration.

One of the desirable qualities of the Liberty signal is that the sound obtained is melodious and penetrating. It will appeal to those motorists who desire a high-grade efficient signal, pleasing to the ear as well as the eye.

The signal proper is constructed in the shape of the famous Liberty bell of history, and its tongue is operated by electricity, the current actuating a coil and a magnet. The operation of the signal is by the conventional push button, which may be located as desired.

The metal used in the Liberty bell is a special alloy, and the operating mechanism is entirely concealed. The signal may be installed on any convenient place on the car, and is made in two sizes. The No. 1 is five inches high and five inches in diameter at the base. The other size is six inches tall and six in diameter at the base.



The Liberty Bell, a Novel Signal Having a Pleasing Tone and Operated by Electricity.

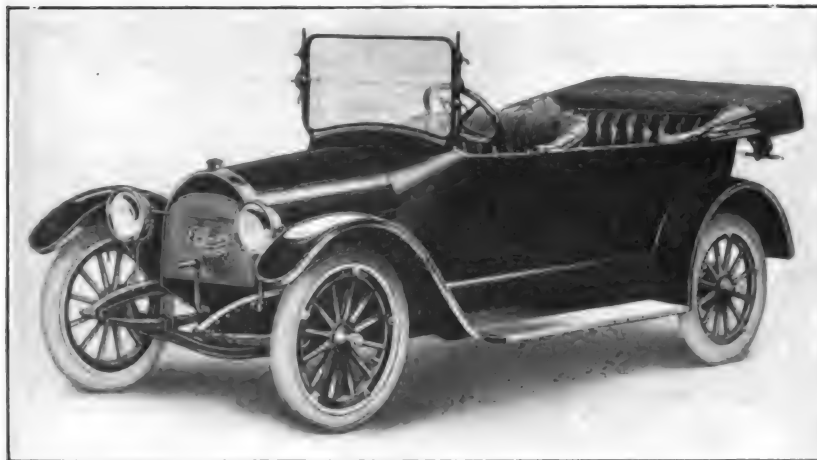
The Liberty bell is water and dust proof, has nothing to get out of order and is guaranteed. It is moderately priced.

PULLMAN JUNIOR A NEW LIGHT MODEL.

FOLLOWING the general tendency towards the light and low-priced car, the Pullman Motor Company, York, Penn., has announced a

shaft bearings are lubricated by positive feed from a plunger pump operated from the rear exhaust cam, the oil passing through a sight feed on the dash and overflowing to supply the splash basins in the bottom of the crank case. An Aplco 12-volt motor-generator is employed, and this is located on the right side of the motor, the energy being applied to the crankshaft of the engine by means of a silent chain operated in oil. The Splitdorf ignition distributor is mounted on the generator, in the conventional manner.

The carburetor is a Stromberg and this is fed by gravity from an eight-gallon fuel tank located in the cowl. The oiling is by force feed and splash system, with a sight feed on the



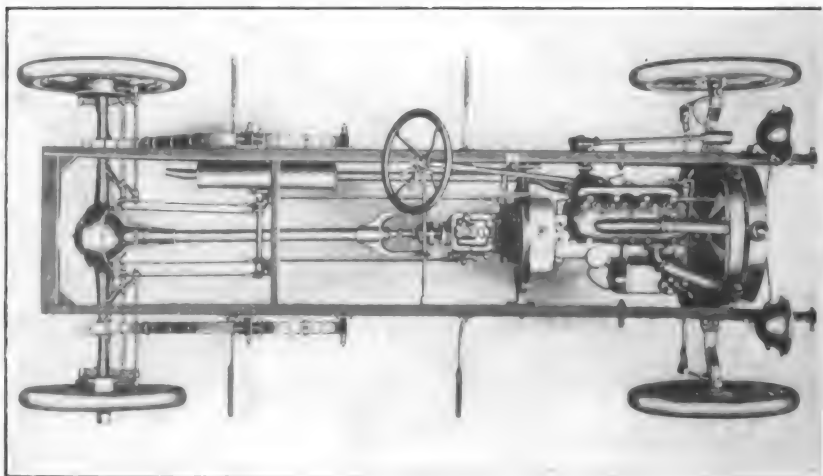
Three-Quarter Front View of the New Pullman Junior, Showing Low-Hung, Streamline Appearance.

new model which is known as the Pullman Junior. This latest product of the York concern sells for under \$750, has a wheelbase of 110 inches, cantilever springs and carries tires 30 by 3½ inches. This company formerly manufactured high-priced cars exclusively, and the announcement of a light model occasioned considerable surprise.

The Pullman Junior has a unit power plant with four-cylinders cast en bloc, separate cylinder head, inlet and exhaust pipes and a barrel type aluminum crank case, which includes the flywheel housing. The motor, an L head type, has a bore of 3¾ inches and a stroke of 4¼, giving it an S. A. E. rating of 22.50 horsepower. All the valves are on the left side, completely enclosed, and have cast iron heads and steel stems. The clear diameter is 1⅝ inches and the lift 7/32-inch. The valves are operated by a chain driven camshaft, and the mechanism is adjustable.

Thermo-syphon cooling is employed in connection with a honeycomb radiator of special Pullman type. The three cam-

dash. The transmission is of selective sliding type, ball bearing and has three speeds forward and reverse, and clutch is a multiple-disc, running in oil, woven wire asbestos against steel. The emergency brake lever and pedals are all carried on the same housing, and the power plant is supported at three points, the two at the rear being on a cross member, which includes a ring attached by the same bolts which hold the engine and transmission together. Back of the transmission is a single universal joint, and directly



Aeroplane View of the Pullman Junior Chassis—Note Straight Parallel Frame Sides and Cantilever Springs.

over it is a round cross member from which is suspended by two links the yoke at the forward end of the propeller shaft housing. This yoke takes the rear axle torque, but the thrust is taken by the springs. The rear axle is of the three-quarter floating type and is fitted throughout with ball bearings. The brakes are $1\frac{3}{4}$ inches wide, acting on 10-inch drums.

Full cantilever rear springs are employed, and semi-elliptic springs are used in front. As may be seen from the accompanying aeroplane view of the chassis, the frame sides are straight and parallel throughout, except where the front ends curve to form the spring horns. A left drive and centre control are used, and the emergency brake lever is located well forward, in the centre, out of the way.

The body presents a pretty picture, as it is of the low-hung type, having a perfect streamline effect. The lines are clean cut throughout and a long, graceful sweep is given from the front of the radiator to the rear of the car. The running boards are broad and clear and add a final artistic touch to the car. The radiator and hood are rounded, and the windshield is curved to fit the cowl snugly. This windshield is a rain vision clear vision, ventilating design, providing a support for the forward end of the one-man top. The standard color of the five-passenger touring model is Brewster green, and the hood, fenders, splash guards and windshield are black enamelled. The doors are of the U type, these setting flush with the sides and having the hinges concealed. Side lights have been eliminated, and dimmers are placed in the 10-inch headlights. The regular equipment includes: Windshield, one-man top, quick acting curtains, speedometer, electric horn, pump, jack, tire repair outfit, tire irons, extra rim in the rear, tools, etc. The extra equipment gives a full Pantasote top, and 31 by four-inch tires, instead of the regular 30 by $3\frac{1}{2}$ -inch.

EAGLE-MACOMBER LIMOUSINE.

The Eagle-Macomber Motor Car Company, Chicago, Ill., announce the production of a new limousine body model, which is fitted to the standard chassis. This light car is equipped with the Macomber five-cylinder, 14 horsepower, rotary motor. The new limousine body, two views of which are shown, is finished in black and gray, the attractive electric side lights adding materially to the appearance of the car. The Macomber motor, according to the company's en-

gineers, is powerful, efficient and inexpensive, developing from 40 to 50 miles on a gallon of gasoline. The motor is air cooled, with which is used a gracefully sloped hood.

One quality of the Macomber motor is absolute lack of vibration. A photograph taken of the motor on a stripped chassis, while turning 1500 revolutions a minute, does not show the slightest blur on the chassis. The Eagle limousine, like the roadster model, is equipped with Houk wire wheels. The other equipment is complete in every respect.

PITTSBURG CLUB ELECTS.

At the annual meeting of the Automobile Club of Pittsburgh, Penn., the following officers were elected: H. Lee Mason, president; Edward J. Kent, W. N. Murray and W. H. Seif, vice presidents; Paul C. Wolff, secretary; William A. Heyl, treasurer, and John C. Bragdon, L. B. Fleming, Frank B. Nimick and A. E. Mieman, governors. The club's active membership is now 800.

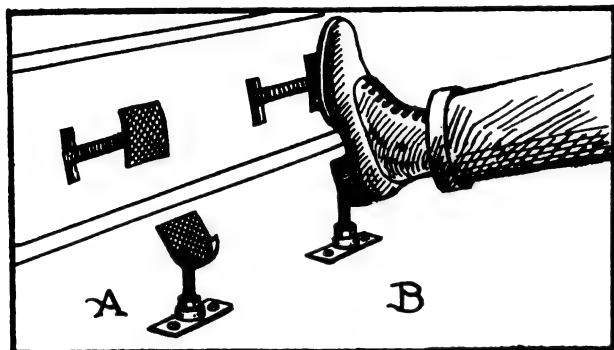
As the result of a letter sent by the president of the Pittsburgh club, the commissioners of Allegheny county have agreed to hold hearings and to listen to suggestions and advice from members of the club on questions of road building. The club asked that the county roads be oiled only on one side at a time, and that the gravel and cinders be spread on the newly oiled road so that the oil may penetrate before the road is opened to traffic. It is asserted that should this be done a great deal of skidding would be avoided and the number of accidents reduced.

JITNEY 'BUS WAR IN CLEVELAND.

John J. Stanley, president of the Cleveland Railway Company, Cleveland, O., in regard to the operation of jitney 'buses in that city, says that his company will also operate a three-cent 'bus line in case privately owned jitneys enter the Cleveland transportation field. He says: "We're not going to be put out of business by the 'buses. If they are coming to Cleveland we'll run some of them ourselves. We'll run ours over the same routes as the private companies, charge three cents fare, with a penny charge for a transfer, and, more than that, the transfer will be good from a railway company 'bus to a street car. If the jitney interests intend to break our neck we're going to die hard".

MECHANICAL NOTES FOR OWNERS.

THE average motorist rides his pedals, that is, keeps a foot on the clutch and brake members, particularly when operating the machine



Illustrating How Home Made Clutch and Brake Pedal Rests Are Made: At A Is Shown the Adjustable Feature; B Outlines the Advantage of the Device.

in crowded traffic. Many drivers form the habit which results in the heels wearing holes in the floor board or its lining.

While foot rests may be purchased, they can be made, and at a slight expense. Generally the material can be procured from the scrap heap in the garage, or purchased for a few cents and, by observing a few precautions, the foot rests may be constructed by anyone familiar with the use of a hack saw, file, drill and tap.

A design for a foot rest is shown in the accompanying illustration and, as may be noted, it is adjustable. The material required is a mild steel or iron plate about $\frac{3}{16}$ or $\frac{1}{4}$ -inch thick, and the metal is cut to conform to the contour of the heel. It should be made slightly larger so that the foot may be moved easily.

One end of the plates is rounded off and to this part is fitted a strip of metal about $\frac{1}{2}$ or $\frac{3}{4}$ -inch wide. The metal is bent to the shape shown in the drawing. Next drill holes through the plate and into the large member. Tap the holes in the foot rest proper and secure the rounded section with machine screws. If a neat job be desired, countersink the curved piece.

The standard for the rest may be constructed of a $\frac{3}{8}$ -inch bolt and a strip of metal. The last-named member should be sufficiently thick to provide a sturdy support for the bolt, and is drilled and threaded to take the bolt. A nut is employed to lock the bolt into place.

The fitting of the top of the bolt to the rest and the ascertaining of the proper angle or slant of the rest, will require careful consideration. By

placing the foot, as when riding the pedal, and using blocks of wood as a foundation, the desired height may be secured, and the angle noted.

Lay the angle off, and cut the bolt accordingly. Having made sure that it provides a natural position for the foot, secure the bolt to the rest proper. The best method is to have the bolt welded to the plate. Any welding shop will perform the work for a few cents, and it will save considerable time as well as insure strength.

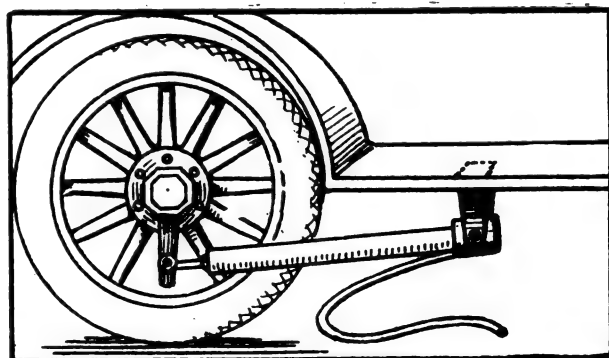
To attach the foot rests to the floor boards, a hole is drilled slightly larger in diameter than that of the bolt. This is necessary to allow the bolt to be screwed down, as when adjusting the pedals. It is not absolutely necessary to make the device adjustable, but such an arrangement will permit of raising or lowering the rest, as when changing drivers, for example.

POWER TIRE PUMP.

A suggestion is made by a reader for constructing a power tire pump. While it is admitted that better results would be obtained by purchasing one adapted to the work, the device will be of interest to those owners who are mechanically inclined.

The pump, its fittings and method of attachment are shown in the accompanying illustration. As may be noted, drive is taken by a wrench fitted to the hub cap of the rear wheel. The wrench is secured by means of a set screw, a hole being drilled through the cap.

The handle of the pump is displaced and a yoke screwed on. This yoke slips over the



Suggestion Contributed by a Reader for Equipping the Car with a Home Made Power Tire Pump.

handle of the wrench as shown, and is loosely mounted, and secured by a bolt passing through the yoke and the wrench. The contributor of

the suggestion for making the pump states that care must be taken in fitting the yoke to the outside portion of the handle of the wrench so that when the wheel revolves the yoke will clear the wrench.

The regular standard or foot part of the pump is removed and in place of it is fitted a piece of piping. The contributor states that he utilized gas piping and attached a bolt to the pipe, which was used as a bearing. The support for the foot end of the pump was constructed of a strip of metal, bent to the shape shown in the drawing, and attached to the bottom or underside of the running board.

To utilize the pump the rear wheel is jacked up and the motor started and run slowly. The wheel in rotating actuates the plunger of the pump, drawing it out and pushing it in. As is obvious, the barrel of the pump moves up and down during the revolution of the car wheel. The reader, who constructed a similar arrangement, states that it will pump up a tire quickly, and that by fitting cotter pins to the bolt passing through the standard on the running board, the pump may be displaced and replaced very readily.

PURCHASING TOOLS.

With the approach of spring those owners who make it a practise to overhaul their cars, should check up the list of tools in the garage and replace any broken members. It is a good plan to make a list of the supplies that will be required.

At this time of the year many supply houses and hardware stores hold bargain sales and by exercising good judgment one can obtain a complete set of tools at a reasonable cost. Many times certain tools can be picked up in second-hand shops. A number of owners have acquired a complete equipment in this manner. In buying tools give preference to those made by well known manufacturers.

BATTERY READINGS.

Readings of the battery should be taken from time to time and for this purpose a hydrometer should be used. The instrument is not expensive and with it it is a simple matter to draw some of the electrolyte from each cell and note the specific gravity of the fluid. Each cell should be tested, and if one falls much below the reading of the others, the battery should be taken to

the expert for examination. While a voltmeter may be utilized, it is not as satisfactory as the hydrometer, which is accurate.

CARE OF IRON TIRES.

It is a good plan to examine the supports and bolts of the tire irons from time to time, as it may be that they have become loosened. When the shoes are secured in the holders by straps, the last-named should be removed from the irons, inspected and tested. Leather straps should be treated with a dressing to prevent their deteriorating. Many a tire has been lost on the road because the straps gave way. Straps are cheaper than new casings.

A PAINTING SUGGESTION.

A painter who makes a specialty of refinishing motor vehicles gives a practical suggestion. He states that it is a good time for those motorists who are considering having their cars painted to place them in the paint shop for, at this season of the year, the work will not be rushed as in the spring.

SPEEDOMETER GEARS.

Few owners give the pinion and gear of the speedometer attention. When the car is operated in mud, etc., the dirt is deposited on the gears, setting up an abrasive action, as well as creating noise. Clean the pinion and gear with a stiff bristle brush, and lubricate the teeth with a paste formed of powdered graphite and oil.

ASSOCIATION BEEFSTEAK DINNER.

The Bay State Automobile Association held a rejuvenation meeting at the Hotel Lenox, Boston, Mass., recently, it being the first of a series of jollifications by which it intends to make the year 1915 notable. The affair was a beefsteak dinner, a smoker and a cabaret show. Every guest wore a chef's cap and apron and was presented with a corn cob pipe.

George McNair, president of the association, presided, and more than 200 were present. The spirit of good feeling was heightened by the announcement that the membership had been increased from 140 to 200. In making the statement the chairman of the membership committee declared that the membership by next June would total 500.

PLANT DOUBLES GRANT CAPACITY.

The Grant Motor Company, Findlay, O., to meet the demand for immediate delivery of Grant sixes, has leased the large plant of a table manufacturing concern in that city, containing over 75,000 feet of floor space. This means that the Grant Company's facilities for manufacturing will be practically doubled, and the combined plants will soon be shipping 50 cars a day.

With reference to this expansion, George S. Waite, general sales manager, says: "Our volume of sales had increased to such an extent that it was necessary to make immediately provision for increased manufacturing space. The acquisition of the addition to our plant places us in a position to make deliveries without the necessity of waiting for the erection of a new building. With our added facilities we will be able to maintain a fixed schedule of between 40 and 50 cars a day, or double our former output. Under the new arrangement the chassis will be completed in our present factory and then taken to the new shops for the addition of the body, final testing and shipment".

At the recent Minneapolis show the company established some new records for the number of sixes sold. The Brice Auto Company, the Minneapolis, Minn., dealer, made hundreds of demonstrations through deep snow and over the steep hills in the vicinity during the show, and contracted for hundreds of cars as a result. Plans are making to ship a train load of machines to California within a few weeks, and similar orders have been received from Omaha, Kansas City and other big distributing points.

BRAENDER TO EXHIBIT AT BOSTON.

The Braender Rubber and Tire Company, Rutherford, N. J., will have a very interesting exhibit at the Boston automobile show, March 6-13. This concern will occupy space 605, department G, and will show a complete line of its tires and tubes, including the new "Bull-Dog" non-skid. The Braender products have accomplished some notable feats in recent racing events and, according to various pilots of the speed machines, they are in the top-notch class in every respect.

NEW MERCER CATALOGUE.

The Mercer Automobile Company, Trenton, N. J., has issued a new catalogue, which is a com-

prehensive description of the company's 22-70 models. This new booklet, approximately nine by 11 inches, 24 pages, contains very excellent illustrations of the new Mercer models, and a complete racing record of the Mercer cars is given for the past four years. Driving a Mercer in the recent Corona race, Eddie Pullen established a new world's record by averaging 87.89 miles an hour in the 301-mile race.

The plant of the Croxton Motor Car Company, Washington, Penn., was sold to J. I. Brownson, A. M. Linn and J. D. Bigger for \$25,000.

ARMAND PEUGEOT DEAD.

Armand Peugeot, designer of the famous French racing car that bears his name, and head of the Peugeot automobile concern, died last week at his Paris home.

COMING EVENTS.

February.

Feb. 22-27—Show, South Bethlehem, Penn.
Feb. 22-27—Show, New Haven, Conn.
Feb. 23-27—Show, Fort Dodge, Ia.
Feb. 23-27—Show, Syracuse, N. Y.
Feb. 23-27—Show, York, Penn.
Feb. 24-27—Show, Anderson, Ind.
Feb. 24-27—Show, Freeport, Ill.
Feb. 27—Grand prize race, San Francisco, Cal., Panama-Pacific Exposition grounds.

March.

March 1-5—Show, Wilkes-Barre, Penn.
March 2-9—Show, Brooklyn, N. Y.
March 3—Convention of Associated Garages of America, Albany, N. Y.
March 3-6—Show, St. Joseph, Mich.
March 4-6—Show, Springfield, Mass.
March 6-13—Show, Mechanic's Building, Boston.
March 6-13—Made in the U. S. A. exhibition, New York City.
March 8-13—Show, Canton, O.
March 8-13—Show, Utica, N. Y.
March 8-15—Show, Des Moines, Ia.
March 13-20—Show, Harrisburg, Penn.
March 14—Panama-Pacific cup race, San Francisco, Cal., Panama-Pacific Exposition grounds.
March 17—Road race, Venice, Cal.
March 22-27—Show, Bangor, Me.

April.

April 3—Show, Paterson, N. J.

May.

May 17-18—A. A. A. annual meeting, Boston, Mass.
May 29—500-mile race, Indianapolis, Ind.

June.

June 9—Track meet, Galesburg, Ill.
June 16—500-mile race, Chicago, Ill.
June 25—Track meet, Sioux City, Ia.

July.

July 4—Road race, Tacoma, Wash.

August.

Aug. 2-3—Convention, Tri-State Good Roads Association, San Francisco, Cal.
Aug. 20-21—Road race, Elgin, Ill.

BOSTON'S BIG NATIONAL AUTOMOBILE SHOW.

DEPARTING from the custom of previous years, which was to inaugurate the exhibition at 8 in the evening, the 13th annual Boston automobile show, which will take place at Mechanics' building, Huntington avenue, Boston, will be opened in the afternoon of March 6 and it will be continued each week day until the evening of March 13. The halls will be opened from 10 in the morning until 10:30 in the evening.

The change from the opening time of the preceding shows was for several reasons, one of which was to afford opportunity for thousands of out of town visitors to attend, and another was

to relieve the congestion that has been so noticeable at all of the openings of former exhibitions. The latter reason was most cogent because of the very large number of exhibitors, insistent demands for space necessitating taking every inch of floor area that could be spared, for incorporated with the show this year, for the first time since 1912, will be the display of motor trucks and wagons by the Boston Commercial Motor Vehicle Association.



Mechanics' Building, Which Will Be the Scene of the 13th Annual Boston Show of the Automobile Dealers' Association.

The show will be the largest that has ever been seen in Mechanics' building, and its 105,000 square feet of exhibition space will be occupied by more individual exhibits than were ever previously shown. For months applicants for stands have been compelled to take less area than asked for, and a considerable number of applicants have

been denied simply from the fact that no more space could be allotted, although numerous adjustments and changes have been made.

The show will be well departmentized, for the main floor will be given over to the exhibits of pleasure cars, the basement to trucks and

wagons, machinery, etc., and the galleries of Grand and Machinery halls and Paul Revere hall to the accessories. As in previous shows the decorations will be a feature, and these will be Grecian in character, which are expected to surpass any ever seen in the hall. Following precedent Wednesday, March 10, will be society and governor's day, the additional designation from the fact that Governor David I. Walsh and his staff have been invited to be present.

COMPLETE LIST OF BOSTON AUTOMOBILE SHOW EXHIBITORS.

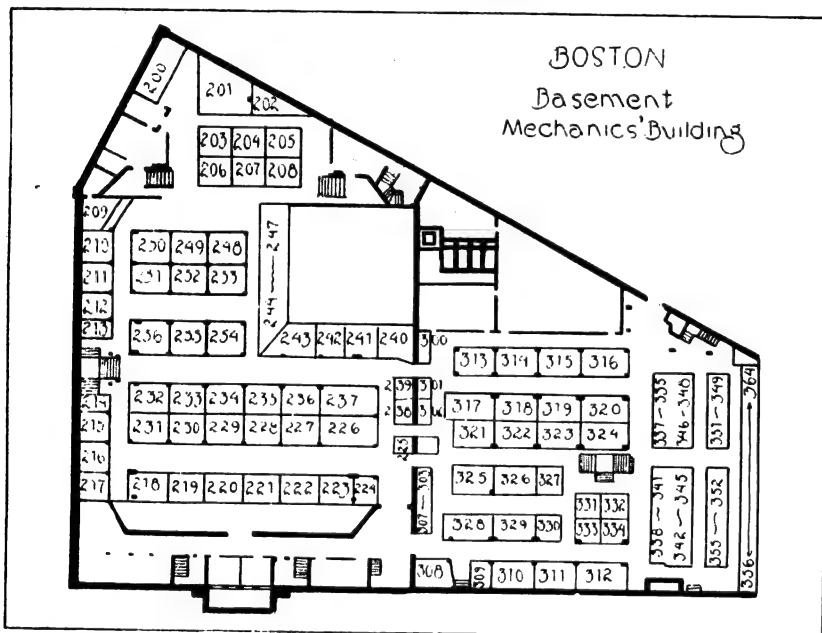
The following is a complete list of those who will make display at the Boston automobile show, and it has been so carefully revised that there will probably be no changes or additions. It includes the pleasure car, motor truck, motorcycle and accessory divisions. In each instance the number of the space to be occupied by the exhibitor is given, and the locations of the spaces in each department of Mechanics' building are shown on the accompanying diagrams. Reference to this list and to the diagrams will so inform the reader that any exhibit can be quickly reached. The list is:

A
24-25—Abbott Motor Co., Detroit, Mich.
314-315-316—Abrams Co., Myer, Cambridge, Mass.
558—A. C. C. Oil Co., Boston, Mass.
238-239—Adrian Bros., Boston, Mass.
515—Ahlberg Bearing Co., Boston, Mass.

560—Ajax Trunk & Sample Case Co., New York City.
546—Albany Lubricating Co., New York City.
509-510—American Motor Equipment Co., Boston, Mass.
443—American Storage Battery Co., Cambridge, Mass.
4—Anderson Electric Car Co., Boston, Mass.

300—Andover Motor Vehicle Co., Andover, Mass.
403—Arnold Co., Boston, Mass.
523—Arnold, N. B., Brooklyn, N. Y.
314-315-316—Atterbury Boston Co., Cambridge, Mass.
619—Atwood, J. H. & G. L., Boston, Mass.
148-149—Auburn Automobile Co., Auburn, Ind.

- 225—Autocraft Co., Cambridge, Mass.
 406—Automatic Appliance Co., Boston, Mass.
 303—Automatic Time Stamp Co., Boston, Mass.
 538—Automobile Legal Assn., Boston, Mass.
 325-326-327—Autocar Sales & Service Co., Boston, Mass.
 514—Automobile Dealer & Repairer, New York City.
 123-124—Allen Motor Co., Fostoria, O.
 423—Atherton, Inc., C. F., Boston, Mass.
- H**
- 538b—Barnstead Water Still Co., Boston, Mass.
 3—Bailey & Co., Inc., S. R., Boston, Mass.
 405—Batchelder-Gallant Co., Boston, Mass.
 14-18—Beacon Motor Car Co., Boston, Mass.
 413—Boston Blacking Co., East Cambridge, Mass.



- 5-9—Bowman Co., The J. W., Boston, Mass.
 432—Bowser & Co., Inc., S. F., Boston, Mass.
 517-557—Boyd, F. Shirley, Boston, Mass.
 605—Braender Rubber & Tire Co., Rutherford, N. J.
 550—Brock Rubber Co., A. S., Boston, Mass.
 140-141-142-143-144—Buick Boston Co., Boston, Mass.
 323—Buick Motor Co., Boston, Mass.
 417-418—Briggs-Detroit Co., Detroit, Mich.
 116—Briscoe Motor Co., Jackson, Mich.
 616—Boyce Co., New York City.
 446—B. & R. Shock Absorber Co., Philadelphia, Penn.

C

- 2—Cadillac Auto Co. of Boston, Boston, Mass.
 600—Campbell Co., A. S., Boston, Mass.
 540—Caldwell, John, Boston, Mass.

- 100aa—Canterbury, Inc., Geo. W., Boston, Mass.
 359-360-361-362-363-364—Cape Cod Power Dory Co., Wareham, Mass.
 554—Carr, George E., Boston, Mass.
 319—Chase Motor Truck Co., Syracuse, N. Y.
 108-109—Chalmers Motor Co. of Mass., Inc., Boston, Mass.
 435—Champion Spark Plug Co., Toledo, O.
 22-23—Chandler Motor Car Co. of Boston, Boston, Mass.
 116—Charles Motor Co., Boston, Mass.
 121a-122—Chevrolet Motor Co. of N. E., Boston, Mass.
 134aa—Class Journal Co., New York City.
 36-37—Cole Motor Co. of Boston, Boston, Mass.
 200-210—Commerce Motor Car Co., Detroit, Mich.
 542-543—Connell Co., W. J., Boston, Mass.
 129-130-247—Connell & McKone Co., Boston, Mass.

- Boston, Mass.
 148-149—Curtis-Hawkins Co., Boston, Mass.
 307—Cut Price Auto Supply Co., Boston, Mass.

D

- 624—Davis Mfg. Co., D. L., Chicago, Ill.
 224—Davison Garage, Holderness, N. H.
 524-525—Dayton Tire Co., Boston, Mass.
 621—Disco Electric Starter Co., Detroit, Mich.
 29—Dodge Bros., Detroit, Mich.
 305—Dodge Sales Co., Boston, Mass.
 614b—Doman & Grasse, Cohasset, Mass.
 100-101-320-324—Donovan Motor Car Co., Boston, Mass.
 419—Dreadnaught Tire & Rubber Co., Boston, Mass.
 563—Dujardin Rubber Co., Inc., New York City.
 427—Dunlap-Brown Oil Co., Boston, Mass.
 24-25—Dutton Motor Co., Inc., F. A., Somerville, Mass.
 420—Dixie Tire & Rubber Co., Boston, Mass.
 323—Dort Motor Car Co., Flint, Mich.

E

- 112—Eads & Lowd, Boston, Mass.
 541—Eagle Oil & Supply Co., Boston, Mass.
 526—Eastern Oil Tank Co., Lowell, Mass.
 337-346—Eastman Spring Co., Waltham, Mass.
 506—Elaner-Lenk & Co., Boston, Mass.
 562—Ellis-Ward Co., Boston, Mass.
 115—Enger Motor Car Co., Cincinnati, O.
 439—Enterprise Rubber Co., Boston, Mass.
 409—Evinrude Motor Co., Detroit, Mich.
 345—Excelator Motor & Mfg. Co., Chicago, Ill.

F

- 306—Farrington Mfg. Co., Boston, Mass.
 612—Farrington, P. K., Boston, Mass.
 200-210—Federal Motor Truck Co., Detroit, Mich.
 113-114—Fiat Motor Sales Co., Boston, Mass.
 521—Flentje, Ernst, Cambridge, Mass.
 404—Filint Motor Parts Co., Providence, R. I.
 620-621-622—Forbes, Walter J., Boston, Mass.
 335-336-347-348—Forbes, Walter J., Boston, Mass.
 413-414—Ford Co., Percy, Boston, Mass.
 117-118—Ford Motor Co., Boston, Mass.
 511—Forest City Electric Co., Cleveland, O.
 126-127a-128—Franklin Motor Car Co., Boston, Mass.
 425—Fraser Co., The M. Abbott, Boston, Mass.
 602-603—Fryer Co., Chas. H., Providence, R. I.
 1-203-204-206-207—Fuller, Alvan T., Boston, Mass.

G

- 241—Garford Co., Elyria, O.
 218-219—General Vehicle Co., Cambridge, Mass.

429—General Electric Co., Schenectady, N. Y.
123-124—Gilmore Co., The E. A., Boston, Mass.
302—Gilmore & Co., R. J., Philadelphia, Penn.
400—Gordon Rubber Co., Canton, O.
318—Grant Motor Co., Findlay, O.
545—Green & Swett, Boston, Mass.

H

352—Haberer & Co., Cincinnati, O.
518-519—Havoline Oil Co., Boston, Mass.
331—Hassler Shock Absorber Co., Indianapolis, Ind.
345—Henderson Motorcycle Co., Detroit, Mich.
349aa—Hersey, Paul G., Boston, Mass.
Table—Harding, W. A., Boston, Mass.
544—Harding Distributing Co., Boston, Mass.
26-27-28—Hart Co., A. T., Boston, Mass.
38—Haynes Automobile Co., Kokomo, Ind.
242—Herald Machine Co., Worcester, Mass.
125-126-127b—Henley-Kimball Co., Boston, Mass.
29—Henshaw Motor Co., Boston, Mass.
345—Henderson Motorcycle Co., Detroit, Mich.
335-336—Highland Body Mfg. Co., Cincinnati, O.
135a-136—Herrf-Brooks Corp., Indianapolis, Ind.
445—Hillman Auto Supply Mfg. Co., Boston, Mass.
528—Holt & Beebe Co., Boston, Mass.
416—Houk Co., George W., Buffalo, N. Y.
623—Holt-Welles Co., Inc., New York City.
125-126-127b—Hudson Motor Car Co., Detroit, Mich.
606aa—Hunt, Edward C., Norwood, Mass.
115-132-133—Hupp Motor Car Co., Detroit, Mich.
608—Hydraulic Oil Storage & Engineering Co., New York City.
618b—Howe Rubber Co. of Boston, Boston, Mass.
345—Hub Motorcycle Co., Inc., Boston, Mass.

I

134-135b—Imperial Motor Car Co., Boston, Mass.
518-519—Indian Refining Co., Boston, Mass.
116—Interstate Motor Co., Muncie, Ind.
226-227-228—International Harvester Co. of America, Somerville, Mass.

J

441—Jackson, Chas. A., Boston, Mass.
503—Jackson Co., Charles A., Boston, Mass.
35—Jackson Motor Car Co., Boston, Mass.
303-304—Jager Engine Co., Boston, Mass.
105-106-107-237—Jeffery Co., Thos. B., Kenosha, Wis.
611—Joyce, Elizabeth A., Boston, Mass.
442—Justice & Co., A. R., Philadelphia, Penn.

K

607—Keating & Decker, Newton,

Mass.

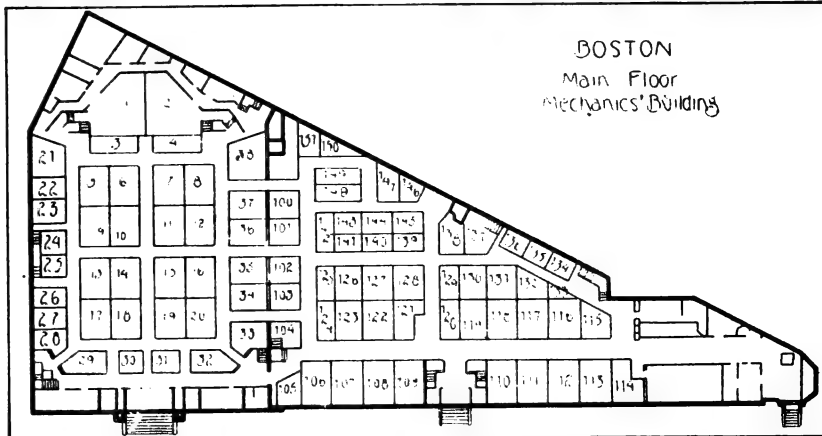
245-246—Kelley-Springfield Motor Truck Co., Cambridge, Mass.
304—Kelleher, J. J., Dorchester, Mass.
30-31—King Motor Car Co., Boston, Mass.
433—Kemco Electric Mfg. Co., Cleveland, O.
34-104—KisselKar, N. E. Branch, Boston, Mass.
428—Knapp Motor Car Co., Lebanon, N. H.
620—K. W. Ignition Co., Cleveland, O.
200-201-202—KisselKar, N. E. Branch, Boston, Mass.
254-255-256—Knox Motors Co., Boston, Mass.
24-25—Krit Motor Car Co., Detroit, Mich.
238-239—Koehler Sporting Goods Co., H. J., New York City.

L

606—Lake Sales Co., New York City.
530—Lee Tire Sales Co., Boston, Mass.
402—Leeffe, H. Ewald, Boston, Mass.
138—Lenox Motor Car Co., Boston,

Mass.

110-111—Maxwell Motor Co., Inc., Detroit, Mich.
310—McFarlan Motor Co., Connersville, Ind.
433—McQuay-Norris Mfg. Co., St. Louis, Mo.
139-145—Metz Co., Waltham, Mass.
Table in 308—Meyers Bros., New York City.
402—Micro Piston Ring Co., New York City.
328—Milburn Wagon Co., Toledo, O.
358—Midgley Tire & Rubber Co., Lancaster, O.
502—Miller, Chas. E., New York City.
434—Miller Rubber Co., Boston, Mass.
110-111—Mitchell-Lewis Motor Co., Racine, Wis.
424—Mitchell & Smith, Inc., Boston, Mass.
311-312—Moline Automobile Co., East Moline, Ill.
Table—Montallo, V., Medford, Mass.
431—Moore Smith Co., Boston, Mass.
408—Moreton, W. H., Boston, Mass.
102-103—Morse, Alfred Cutler & Co., Boston, Mass.
433—Motor Parts Co., Boston, Mass.



Mass.

119-120-235-236—Linscott Motor Co., Boston, Mass.
211-212—Lippard Stewart Motor Car Co., Cambridge, Mass.
13-17—Locomobile Co. of America, Boston, Mass.
123-124—L. P. C. Motor Co., Racine, Wis.

M

301—Magnus, M. E., New York City.
15-19—MacAlman, J. H., Boston, Mass.
317-321—Maddocks Co., Inc., H. Ross, Boston, Mass.
16-20-248-249-250-251-252-253—Maguire Co., J. W., Boston, Mass.
416—Martini & Huneke Co., New York City.
209-210—Mals Motor Truck Co., Indianapolis, Ind.
601aa—Master Carburetor Sales Co., Boston, Mass.
539—Mass. Mutual Auto Co., Inc., Boston, Mass.
524—Marathon Tire & Rubber Co., Akron, O.
604—Max Machine Co., Clinton, Mass.
625a—Malton Specialty Co., Boston, Mass.
310—Maxim Motor Co., Middleboro.
137—Olds Motor Works, Lansing,

448—Motor Supply Shop, Inc., Boston, Mass.
514—Motor Vehicle Pub. Co., New York City.
400—Mulherin, V. J., Boston, Mass.
559—Murray & Co., P. A., Newton, Mass.
345—Miami Cycle & Mfg. Co., Middletown, O.

N

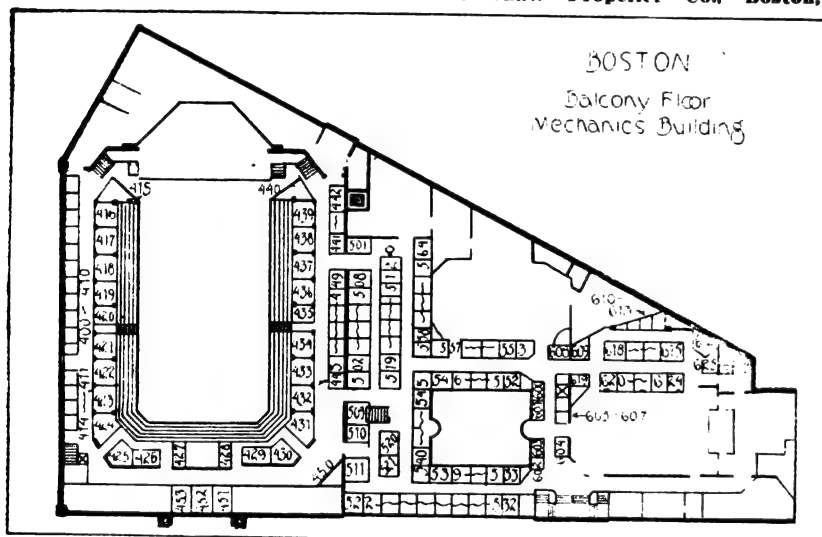
Special—National Highway Association, Cambridge, Mass.
26-27-28—National Motor Vehicle Co., Indianapolis, Ind.
601—National Tire & Rubber Co., Boston, Mass.
339—New England Motorcycle Co., Boston, Mass.
214-215—New England Truck Co., Fitchburg, Mass.
440—New York Lubricating Oil Co., Boston, Mass.
8-12—Nurdyke & Marmon Co., Indianapolis, Ind.
441—Northern Engineering Works, Detroit, Mich.

O

146-147—Oakland Motor Co., Boston, Mass.
613—Orono Mfg. Co., Boston, Mass.
Mich.

P

421-422—Paterson Co., W. A., Flint, Mich.
 1-203-204-206-207—Packard Motor Car Co., Detroit, Mich.
 33-329-330—Paige Motor Co. of Boston, Boston, Mass.
 616—Peacock & Co., Clarence N., New York City.
 14-18—Peerless Motor Car Co., Cleveland, O.
 500-501—Perkins-Campbell Co., Cincinnati, O.
 339—Pope Mfg. Co., Westfield, Mass.
 429—Picard & Co., A. J., New York City.
 16-20-248-249-250-251-252-253—Pierce-Arrow Motor Car Co., Buffalo, N. Y.
 504-506—Platt & Washburn Refining Co., Boston, Mass.
 110-111—Pope Hartford Co. of Boston, Boston, Mass.
 112—Premier Motor Car Co. of N. E., Boston, Mass.
 533—Pressure-Proof Piston Ring Co., Boston, Mass.
 436—Presto Inter-Rim Co., Boston, Mass.



539—Pyrene Co. of N. E., Boston, Mass.
 353-354-355—Pullman Motor Car Co., York, Penn.

R

552—Rand, H. L., Worcester, Mass.
 411—Randall Co., Quincy, Mass.
 14 and 18—Rauch & Lang Carriage Co., Cleveland, O.
 417-418—Reed-Crockett Co., Boston, Mass.
 340-341-342-343—Regal Motor Car Co., Detroit, Mich.
 331-332-333-334—Republic Motor Truck Co., Alma, Mich.
 401—Reynolds Oil and Supply Co., Boston, Mass.
 517—R. I. V. Co., New York City.
 Table opp. 332—Rosc, Peter R., Boston, Mass.
 102-103—Renault-Freres Selling Branch, Inc., New York City.
 119-120-235-236—Reo Motor Car Co., Lansing, Mich.
 340-341-342-343—Robinson Co., C. A., Boston, Mass.
 222-223—Robinson Fire Apparatus Mfg. Co., Boston, Mass.
 527—Robinson & Son, Co., W. C.,

Boston, Mass.
 105-106-107-237—Rockwell, Inc., C. P., Boston, Mass.
 205-208—Rowe Motor Mfg. Co., Downingtown, Penn.
 38—Russell Co., W. L., Boston, Mass.
 512-513—Rutherford Rubber Co., Boston, Mass.

S

548—Salman, John A., Boston, Mass.
 532—Sanders-Wilson-Barnaby, Inc., New York City.
 610—Sani-Mist Co., Hartford, Conn.
 32—Saxon Motor Co., Boston, Mass.
 430—Scott & Co., Ltd., Boston, Mass.
 624—Scrannage, Lawrence E., Medford, Mass.
 121b—Scripps-Booth Co., Detroit, Mich.
 410—Scudor Mfg. Co., Lowell, Mass.
 321—Service Motor Car Co., Wabash, Ind.
 548—Sewell Cushion Wheel Co., Detroit, Mich.
 547—Sharrer Patent Top Co., Inc., New York City.
 516—Shaw Propeller Co., Boston,

100-101-320-324—Studebaker Corp., Detroit, Mich.
 131—Stutz Motor Car Co., Boston, Mass.
 328—Stimpson, E. Y., Boston, Mass.

T

446—Taylor Sales Co., J. M., Chicago, Ill.
 241—Taylor Corporation, R. E., Boston, Mass.
 507-508—Texas Co., Boston, Mass.
 402—Thomas Carbon Remover Co., Cordland, N. Y.
 447—Tobey, W. L., East Boston, Mass.
 221—Touraine Co., Philadelphia, Penn.
 615—Triplex Inner Tube Co., Inc., Boston, Mass.
 349-450—Trumbull Motor Car Co., Bridgeport, Conn.
 319—Tucker Co., J. C., Narragansett Pier, R. I.
 311-312—Turner, Harrison, Boston, Mass.
 317-321—Twombly Corp., Avondale, N. J.

U

535-536—Underhay Oil Co., Boston, Mass.
 200-210—U. S. Mill Supply Co., Providence, R. I.
 555—Universal Shock Eliminator, Inc., New York City.
 442—U-Kan-Plate, Philadelphia, Penn.

V

618a—Vedoe Inflator Co., Boston, Mass.
 504-505—Veedol, Boston, Mass.
 150-151—Velle Motor Vehicle Co., Cambridge, Mass.
 221—Victor Motor Car Co., Boston, Mass.
 421-422—Vining, R. W., Boston, Mass.

W

318—Waltz Co., Harold S., Brookline, Mass.
 537—Walker Lithograph & Pub. Co., Boston, Mass.
 625a—Waterbury, Louis S., Boston, Mass.
 9—Waverly Co., Indianapolis, Ind.
 553—Webber Mfg. Co., Boston, Mass.
 115-132-133—Wentworth-Fordick Co., Boston, Mass.
 331-332-333-334—Wentworth-Brown Co., Boston, Mass.
 450—Westinghouse Air Spring Co., Boston, Mass.
 137—Wheelock-Jefferey Co., Boston, Mass.
 7-11-216-217—White Co., Boston, Mass.
 229-230-231-232-233-234—White Co., Boston, Mass.
 545—White & Bagley Co., Worcester, Mass.
 129-130-247—Willys-Overland Co., Toledo, O.
 556—Wilson Co., John V., Boston, Mass.
 305—Wilson, J. R., Lincoln, Neb.
 8-12—Wing, Frank E., Boston, Mass.
 6-10-220—Winton Motor Car Co., Boston, Mass.
 529—Wonder-Mist Co., Boston, Mass.
 411—Wollaston Foundry Co., Wollaston, Mass.

X

412—"X" Laboratories, Boston, Mass.

EIGHT-CYLINDER MOTOR FIRING ORDERS.

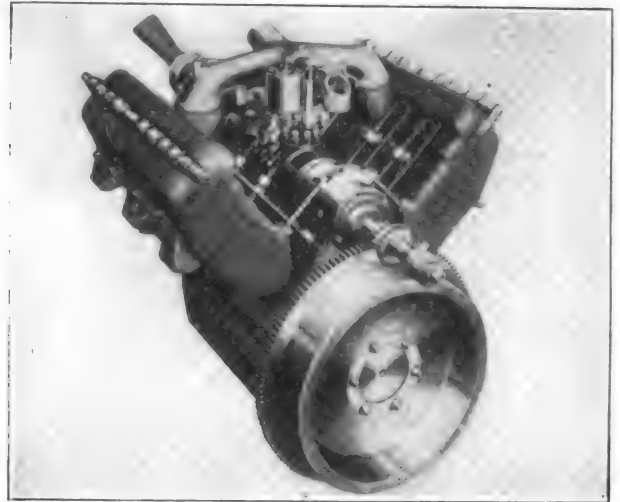
In Every Instance the Explosions Occur Alternately in the Banks—In Prevailing Practise the Sequence Is 1-3-4-2.

THE production of eight-cylinder motors has been rapid since the announcement made by the Cadillac Motor Car Company last fall that it was to market in 1915 an eight-cylinder motor vehicle, to sell at the same price as its 1914 car. That this type of motor appeals strongly to the motorist as well as the manufacturer is evidenced by the announcement of an eight-cylinder car by nearly a dozen makers of pleasure motor vehicles. That these will be followed by a number of others is believed probable by those in close touch with the automobile industry. That manufacturers of motors anticipate a demand for the eight-cylinder types can be judged from the fact that they are now built by at least six well known concerns, and another maker of a motor universally known, is stated to be perfecting a design.

Those who have followed the development of the internal combustion motor will recall the arguments, favorable and unfavorable, of the six-cylinder motor when the four-cylinder type was considered standard. The arrival of the eight has created similar discussion of its practicability and economy by engineers and the trade, but the average motorist cannot follow the technical detail relating to this type.

Before discussing the advantages, construc-

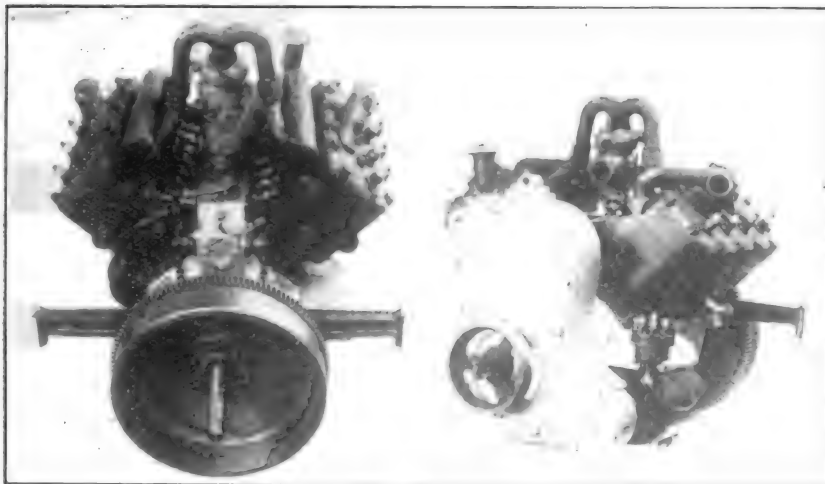
tion and operation of the eight-cylinder motor, its development may be briefly reviewed. That the eight-cylinder engine is not new is not gen-



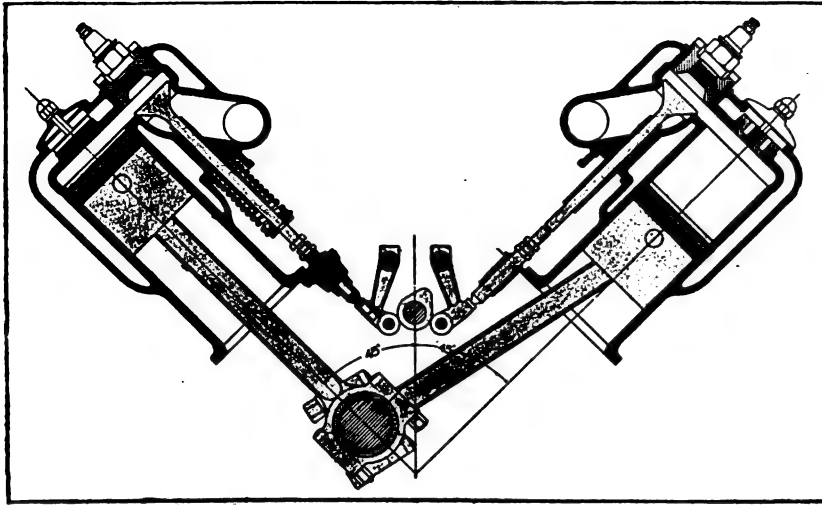
The Ferro Motor, with Overhead Rocker Type Valves and Exhaust Manifolds Outside of the Blocks.

erally known to automobilists; in fact, it was utilized in some of the earliest aeroplanes, including the Antoinette, the J. A. P., the Wolseley, the E. N. V., etc., but motorists as a rule take little interest in these constructions. Messrs. DeDion-

Bouton, a French concern, is credited with being the first to produce an eight-cylinder motor as a commercial proposition, but was not the first to adapt it to the motor vehicle, for as early as 1902 Charron, Girardot & Voight built an experimental car with an eight-cylinder engine with the cylinders tandem. A similar type was driven in the Grand Prix race of 1907, and the maker of the Rolls-Royce produced an eight-cylinder V motor in 1905, known as the Legalimit car. The Darracq, which was driven in speed tests on the Florida beach several years



Rear and Three Quarter View of Regal Eight-Cylinder Motor—The Illustration at Left Shows Carburetor, Intake and Exhaust Manifolds.



Longitudinal View of Cadillac Motor, Showing One Cam Actuating Two Valves and the Forked Type of Connecting Rods.

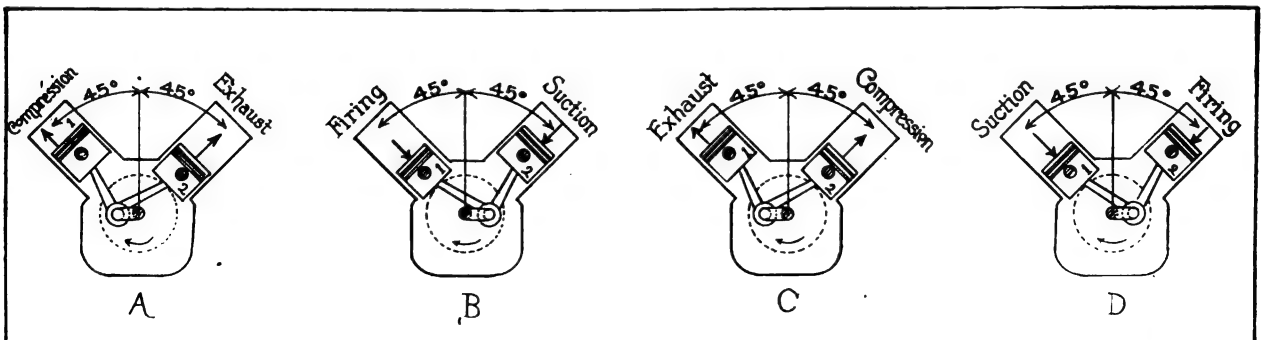
ago, was another example of the V eight.

The all-in-line type was not practical for vehicles because of its length. It required a 100 per cent. longer and stronger crankshaft, and other factors also militate against it. Its crankshaft design is as though two four-cylinder crankshafts were placed tandem, the one having its webs at an angle of 90 degrees to the other. Because of its extreme length and the fact that the wheelbase of a motor vehicle constructed for ordinary use is limited as to length, the body space of the car would be sacrificed to utilize such a motor.

These militating factors are eliminated in the V type eight-cylinder motor, which consists of two blocks of four cylinders, each so arranged that one set or block is at an angle of 90 degrees to the other, as may be noted in accompanying illustrations. By having one crankpin serve for two connecting rods, an eight-cylinder motor can be built with a crankshaft no longer than that of a standard four-cylinder engine, and it can be installed in a vehicle in practically the same space.

Relative to weight, the cylinder blocks of the eight-cylinder motor weigh about 15 per cent. more than those of the six. The V type, eight-cylinder motor is so compact it can be installed in a chassis built or designed for a four-cylinder power plant. Although the horsepower of the eight is greater than that of a four of similar bore and stroke—in the case of the Cadillac motors it is estimated to be 70 against the 50 of the four—the components of the chassis need not be strengthened when this type replaces the four.

Apparently there is a great deal of misconception as to the advantage of the two extra cylinders of the eight as compared with the six. It should be borne in mind that the multiplication of cylinders from time to time has not been to obtain increased power, but to secure continuous torque, flexibility and to eliminate vibration. The ideal internal combustion engine is that which will nearest approach the operation of a steam turbine, and advocates of eight-cylinder V type motors maintain that these desired qualities are more or less realized in this type engine.



Illustrating Action of a Two-Cylinder V Type of Motor—A, Position of Pistons at Completion of First Half of First Revolution of Crankshaft; B, Second Half; C and D, First and Second Halves of Second Revolution.

The advantage that appeals to the designer and motorist alike is the practically continuous torque of the eight-cylinder motor. For those not familiar with the term torque, explanation may be made that it means turning effort, and since the gasoline motor obtains its energy from the explosion of the mixture in the combustion chamber driving the piston downward and rotating the crankshaft, the superior torque of the eight-cylinder motor over other types will be best explained by considering the operation of a four-cylinder motor.

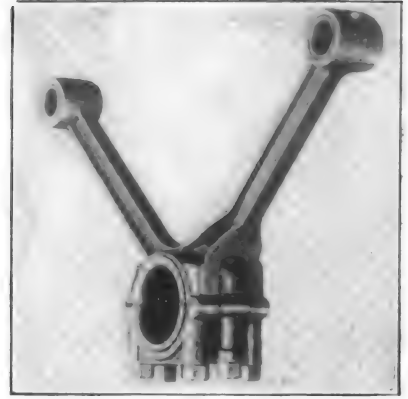
As may be noted in an accompanying illustration showing the crankshaft of an eight-cylinder motor, which is identical with that of a four-cylinder, the throws are at 180 degrees and the firing strokes or impulses occur at equal intervals—or, in other words, the intervals between the impulses are half a revolution of the crank-

engine the explosions overlap by one hour, that is to say, that when the second cylinder fires at 4 o'clock, the first or 12 o'clock cylinder has one hour to go. It is because of this over-

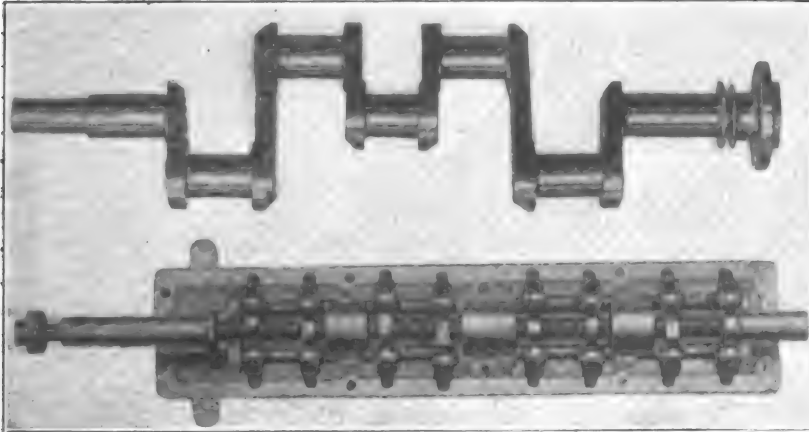
lapping of the strokes that the six-cylinder motor provides better torque than the four.

Statement is made that the eight-cylinder V motor has a torque 33 per cent. more uniform than that of the six. To make clear this point, consider that the motor is tipped over on one side so that one block of cylinders is vertical, and assume that with the horizontal group the crank chamber is marked in the same way as the face of a clock. These cylinders will produce impulses at 3 p. m., 9 p. m., 3 a. m. and 9 a. m., the intervals being half a revolution. No two explosions will occur at the same time, but they take place in sequence at equal intervals of a quarter revolution. Considering the example of the clock once more, of the eight will be apparent when one realizes that when any one explosion occurs, the previous one has still two hours to go. Each impulse lasts theoretically 75 per cent. of the stroke. The application of energy to the crankshaft of the eight-cylinder motor is, therefore, continuous.

When mention has been



Connecting Rods of Ferro Motor.



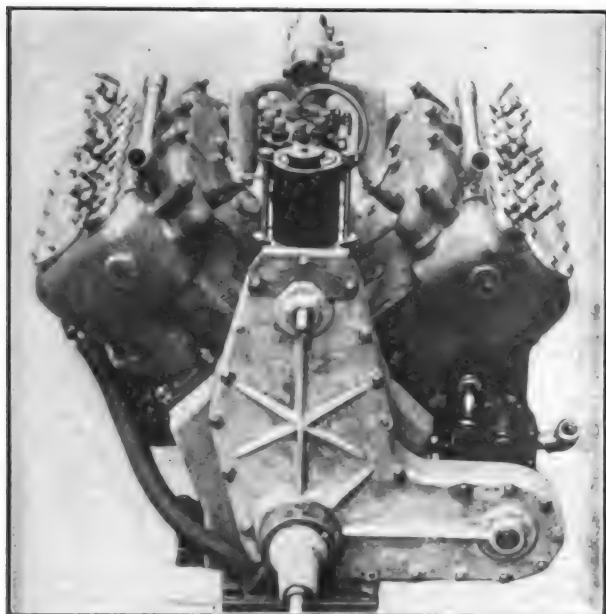
Illustrating Crankshaft of Cadillac Eight-Cylinder Motor and Use of One Camshaft for Sixteen Valves.

shaft, or 180 degrees. Because in the four-cylinder engines one pair of pistons is at the bottom of the stroke when the other pair is at the top of the stroke, termed bottom and top dead centres, there can be no overlapping of the impulses. The force of energy of the explosion is not exerted during the entire down or firing stroke, because generally the exhaust valve opens slightly before the piston has completed its full travel.

With the six-cylinder motor three impulses are obtained each complete revolution, or the firing strokes take place 120 degrees apart. A simple explanation of these impulses may be obtained by comparing the intervals to a clock, considering the crankshaft as the hour hand, and the first revolution of the flywheel as a. m., and the second as p. m. The impulses of the six under these conditions will occur at 12, 4 and 8 o'clock. From this one will note that in the six-cylinder



The Forked Type of Connecting Rods.



Front View of Remington Eight-Cylinder Motor.

made of the possibility of a 12-cylinder motor in the near future, and its advantages over an eight. A chart showing torque or turning movement of the eight-cylinder motor reveals the fact that its line is comparatively straight and that that of a 12-cylinder is scarcely distinguishable from the eight, for which reason engineers maintain that for ordinary purposes the eight is the practical maximum.

In analyzing the power strokes of the eight-cylinder V type motor the novice is apt to become confused, especially if he considers the four-cycle, vertical, multiple-cylinder motor. The engine of the last named design obtains its impulses at equal intervals, but the V type differs radically. Because of the angle between the cylinders placed at 90 degrees to each other, the two pistons do not start and finish their strokes together.

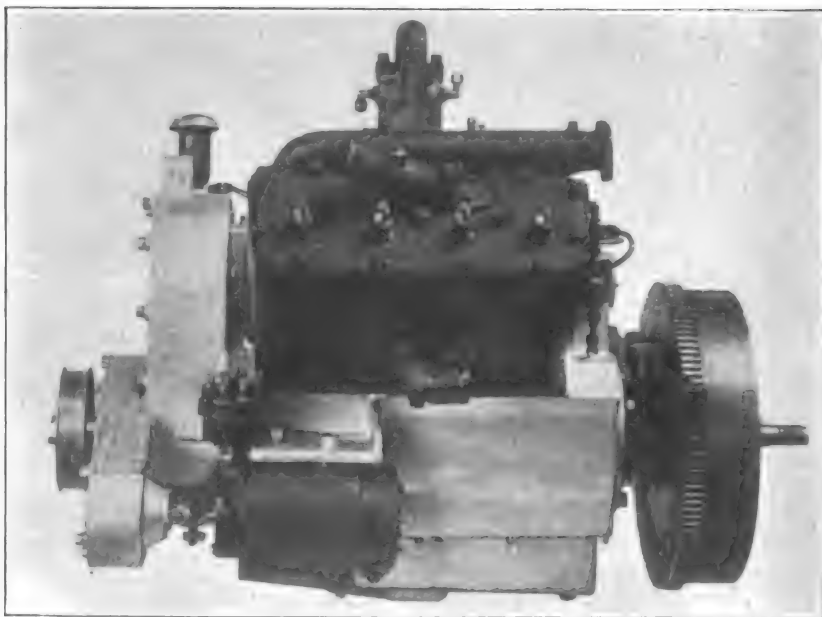
By referring to an accompanying illustration which shows the action of a two-cylinder V type motor during two complete revolutions of its crankshaft, one may note that when piston No. 1 is at top dead centre, piston No. 2 has accomplished about two-thirds of its upward stroke.

When piston 2 is completing the balance of its upward stroke, piston 1 will be moving down. After piston 2 attains top dead centre and starts downward, it will be moving in the same direction as piston 1, but as previously explained, it will have covered only about two-thirds of its stroke when piston 1 completes its downward movement. As may be noted by the four diagrams not only do the strokes overlap, but the cycle also overlaps.

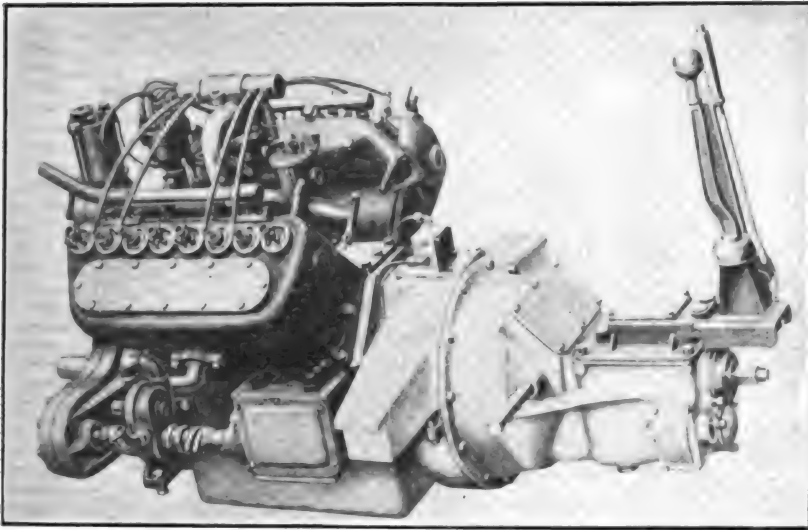
In the first half of the first revolution of the crankshaft, shown at A, piston 1 is moving upward on the compression stroke, while piston 2 has started on its exhaust stroke. At B, piston 1 has moved down about one-third the impulse stroke, and piston 2 has completed the exhaust stroke and has started the intake stroke. Diagrams C and D illustrate the strokes during the second revolution of the crankshaft.

The firing order of the eight-cylinder motor is apt to be confusing to the motorist, especially when it is considered that there are eight possible sequences. The majority of the engineers favor the alternate firing from side to side; that is, from the right to the left bank, or vice versa, and with a 1-3-4-2 sequence, counting the front cylinder as the No. 1.

The firing order as given by several manufacturers is as follows: 1-4, 5-2, 7-6, 3-8; 1-8, 3-6, 4-5, 2-7; 1-6, 3-5, 4-7, 2-8. Some makers call the left front cylinder, that nearest the radiator, the No. 1, and the opposite cylinder the No. 8. One



Side View of Regal Eight-Cylinder Motor, Showing Location of Generator and Distributor.



Unit Power Plant of Briggs-Detroit, Showing Separate Water Outlet Manifold for Each Bank of Cylinders.

arrows illustrate the alternations from bank to bank, the sequences should be easily understood.

The development of the eight-cylinder motor has been so rapid that there is a considerable difference in design, particularly the camshaft. Some makers favor the placing of the valves on the inside of the V and operate them from a camshaft having eight cams, one cam actuating two valves, while others employ 16 cams. Generally the three-bearing crankshaft is used, although two makers have a two-bearing shaft.

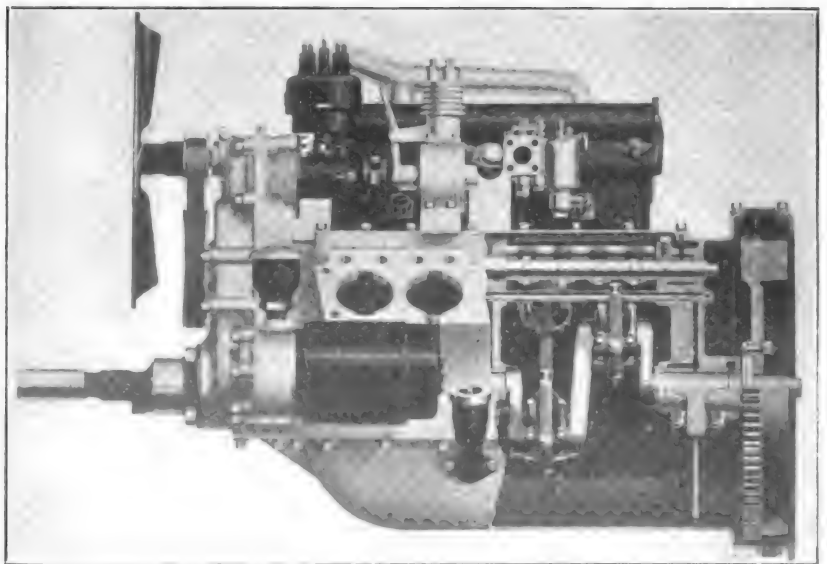
manufacturer designates the left front cylinder as the No. 1 and that directly opposite it the No. 5. Another refers to the blocks as right and left, and number each block 1, 2, 3 and 4.

By adapting this last stated designation the firing order is more easily understood. For example, with the motors starting with the first cylinder of the left bank the firing will alternate as follows: 1 L, 2 R; 3 L, 1 R; 4 L, 3 R; 2 L, 4 R. As may be noted with this firing order the sequence in the left bank of cylinders is 1-3-4-2, but examination of the right banks reveals an order of 2-1-3-4; yet if we begin with the No. 1 cylinder and trace it the firing order will be found 1-3-4-2.

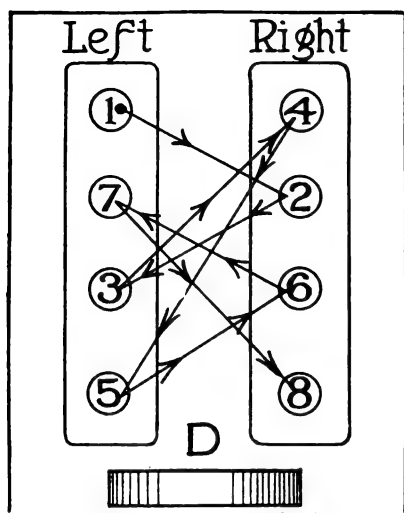
These motor manufacturers have adapted the following firing order: 1 R, 1 L; 3 R, 3 L; 4 R, 4 L; 2 R, 2 L. This is firing order of 1-3-4-2 with both right and left banks of cylinders. The makers using this firing order consider it advantageous because two successive impulses acting on one crankpin have substantially the effect of a prolonged impulse with its average thrust in a vertical line, and since all crankshaft and crankpin bearings are generally split in a horizontal plane, it is preferable that the thrust should be as nearly as possible at right angles to the plane of the split. Accompanying diagrams show the various firing orders, and as

With one exception the eight-cylinder motors are L head types and the valve mechanisms are enclosed. The Ferro motor has overhead rocker valves and fully protects them. The cylinders are cast en bloc and several designs have detachable heads. In practically every instance access is afforded to the combustion chambers and water jackets by detachable plates or caps.

There are two methods of attaching the connecting rods to the crankpin of the crankshaft, the one placing the rods side by side and the other yoking them. An accompanying illustration shows the last named method, and as may be noted, one end of the large connecting rod



Part Sectional View of Klug Motor, Illustrating the Side-by-Side Type of Connecting Rods, Crankshaft, Etc.



Firing Order of the Cadillac Motor.

the outer surface of the bearing. The latter connecting rod oscillates approximately only 32 degrees. The bushings in the forked type connecting rods are not adjustable and cannot be fitted or scraped, as this would affect the fit of the connecting rod, which must oscillate outside of the bushing. Statement is made, however, that the yoke type will afford 30,000 miles of service without attention, provided it is properly lubricated.

The side by side connecting rods are favored by three makers and both the bearing caps and bearings are split on a horizontal plane. This construction permits adjustment for wear in the conventional manner by removing shims. Claim is made that the amount of shim removal necessary to make a practical adjustment is not sufficient to affect the slight oscillating movement

bearing is forked and the other operates on the bushing attached to the fork.

The bearing is prevented from turning in the connecting rod shown at the right, while the connecting rod at the left has its bearings and oscillates upon

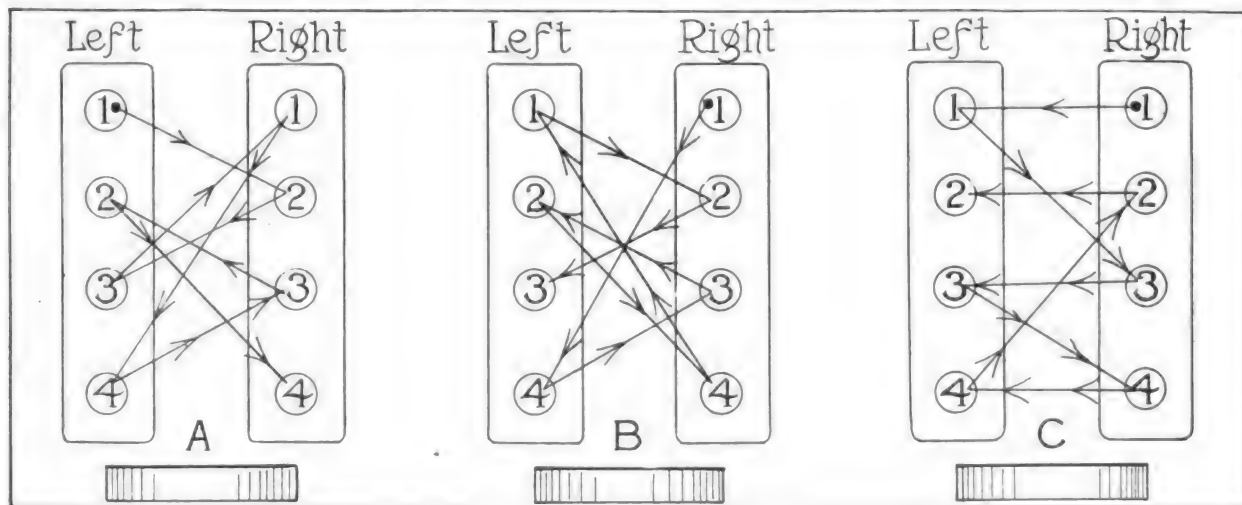
through which the centre connecting rod moves on the outside of the bearing bushing.

The eight-cylinder motor can be efficiently cooled and statement is made that the temperature of the water of the first and last cylinder is practically the same. Because of the natural circulation of water a radiator used with a four-cylinder motor of same power is ample, and thermosyphon system of cooling is in every way sufficient. Two motor manufacturers water jacket the intake manifold, the Ferro engine having a concentric manifold in which the water circulates.

The V type eight-cylinder motor is suited to uniform gas distribution, and a carburetor having but one float chamber and one spray nozzle will amply serve. In every instance the carburetor is located between the banks of cylinders, midway fore and aft and transversely. The design of the intake manifold or piping is such that there is no tendency for more mixture to be drawn to one block than to the other, and this, coupled with the uniform cylinder temperature, are factors in attaining evenness of torque.

Relative to fuel consumption, claim is made that from 18 to 22 miles are obtained to a gallon of fuel with one make of motor having a bore of $3\frac{1}{8}$ inches and a stroke of $5\frac{1}{8}$, which represents a piston displacement of 314.6 cubic inches. This motor, although rated at 31.25 horsepower by the S. A. E. formula, is stated to develop 70 at 2400 revolutions a minute, which indicates that the eight-cylinder engine is economical of fuel.

Because the eight-cylinder motor cannot be lubricated efficiently by splash lubrication, as one set of cylinders might be starved and the other flooded, a pressure system is always used.



Showing the Firing Sequences of Eight-Cylinder Motors—A, Order Begins with Left Front Cylinder; B, with Right Front Cylinder; C, Showing the Sequence of 1-3-4-2 with Both Banks.

TEXAS OIL GETS DISBROW'S O. K.

The Texas Company, 17 Battery place, New York City, will send to any motorist who addresses the advertising department, a letter from Louis Disbrow, famous racing driver, in which he tells of his experiences with Texaco motor oil. Mr. Disbrow has driven cars in all kinds of contests and his statement relative to Texaco lubricants will be of special interest to all car owners. Texaco motor oil is well known, both nationally and internationally, as a standard product of high quality, that will afford the best results to the motorist who desires efficiency, satisfaction and economy in lubrication.

MOTOR PARTS SERVICE COMPLETE.

The Motor Parts Company, 187 Columbus avenue, Boston, Mass., distributor of Bosch electrical automobile equipment and several other standard products, has specialized quick and efficient service for all motorists in New England by its extensive chain of supply and service stations. There is now about 25 of these located in the principal commercial centres of New England, where owners of cars can obtain from stock any of the specialties handled, or the advice or the service of experts. This system of service stations is a development of the principle of co-operation and it is a great advantage to motorists who can buy practically direct and have the benefit of the direct attention that can only be offered by experience. Besides the Bosch products the company is distributor for Kemco fan generators, Zenith carburetors, Leak-Proof piston rings and other widely known accessories.

RHODE ISLAND ORGANIZATION.

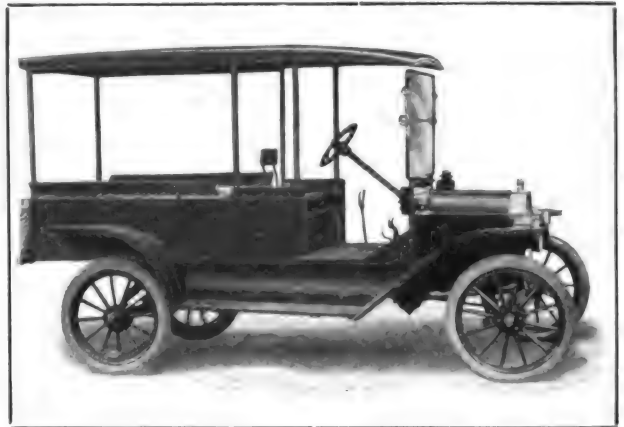
The United Motor Industries of Rhode Island has been formed by the men engaged in the motor car, garage, tire and accessory industry. At the first meeting, 63 of the 75 present joined the new organization, and members will be added in the near future. The officers elected were: Albert E. Goodby of Goodby-Rankin Company, president; Frank F. Kellogg, Providence Auto Equipment Company; Charles F. Thatcher, Aetna Bottle and Stopper Company, Buick dealer, and William S. Achorn, Crown garage, vice presidents; Charles A. Paine, Belcher & Loomis Hardware Company, treasurer, and Henry Corp, Corp Brothers, secretary. All of the above are

located in Providence, R. I.

The directors are: Frank Crook, Pawtucket; John R. Magee, Bristol; B. Morgan, Newport; H. L. Capron, Attleboro; A. B. Smith, Westerly; William A. Flinn, Narragansett, and L. M. Jackson, G. H. Gifford, Charles R. Manchester, Herbert A. Thayer, John O'Donnell, Frank A. Glover and William Hughes, all of Providence.

COMMERCIAL BODIES FOR FORDS.

The London Auto Supply Company, Chicago, Ill., builder of London commercial bodies for Ford chassis, manufactures this equipment in standard types, or to specifications. Dealers in London commercial bodies can sell from a catalogue, their customers can make selection of what meets their requirements, and deliveries are promptly made from factory stock. The dealer need make no investment and no stock need be

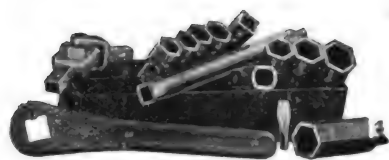


A London Commercial Body Fitted to a Ford Chassis.

carried. The bodies can be quickly installed by the buyer with cost for labor. If request be made the company at 2540 Wabash avenue, Chicago, Ill., Dept. B., a complete catalogue will be mailed the inquirer.

GREEN & SWETT'S CATALOGUE.

Green & Swett, 737 Boylston street, Boston, Mass., distributor for Mohawk tires and Oilzum lubricants, have published a complete catalogue describing the hundreds of articles of motor vehicle equipment, accessories and supplies that are carried in stock. This catalogue is well illustrated and will be sent to any motorist at request. Green & Swett make a specialty of mail orders, all of which are filled and shipped the day received.



No. 30

Mossberg "Safety First" Set of Socket Wrenches

Surely, the most complete **Ford** set of wrenches on the market for **\$4.00**

Contains: No. 355 Ratchet Handle
One Long Extension Tube
One Universal Joint
One Screw Driver Bit
Ten Pressed Steel Sockets (heaviest made)

Ten Socket Wrenches for \$2.00

HONEST, CAN YOU BEAT IT?

Hex. $\frac{1}{2}$ " $\frac{3}{4}$ " $\frac{7}{8}$ " $1\frac{1}{8}$ "

$\frac{1}{2}$ " $\frac{3}{4}$ " $\frac{7}{8}$ "

Square $\frac{1}{2}$ " (1915 main bearing nuts)

Spark Plug Socket $\frac{3}{4}$ "

Oval Socket (main bearing nuts)



All Steel Monkey Wrench No. 100

Your "life-insurance" against loose adjustments, and resulting accidents. Polished, mechanics' finish, each wrench packed in carton, thoroughly hardened and absolutely guaranteed.

Price each **\$.60**

10 inches long

Price **\$4**

In Canvas Kit **\$2.00**

No. 10 Set of

**FORD Engineers' Wrenches**

Thin-model, guaranteed, open end wrenches, thoroughly hardened and excellent finish. Five wrenches—10 openings. Packed in enamel duck case.

Price, per set, **\$1.27**

**Reverse and Brake Pedal Tension Spring Wrenches**

No. 645

Ratchet Wrench, designed especially for reverse and brake pedal springs. Saves 30 minutes every time you use it.

Price, each - - **50c**



No. 640

Goose neck, plain open end, for reverse springs

Price **12c each**

MASTER TOOLS

—FOR—

Ford Automobiles**Frank Mossberg Co.****ATTLEBORO, MASS.**

Send for Catalog
No. 171.E

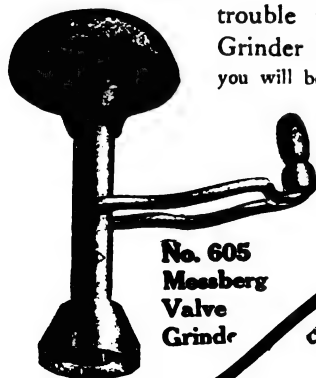
**Be MASTER of Your FORD!**

The most discouraging trouble with motors is the need of frequent grinding of valves. If you will take the

trouble to investigate No. 605 Grinder of **Mossberg** brand,

you will be surprised to know how easy the valve troubles are entirely obviated.

Price, each **25c**



No. 605 Mossberg Valve Grinder

The cleverest ever invented for **Ford** cars is the wrench

No. 630, designed for cylinder head nuts and rear axle housing nuts. You know yourself how hard it is to get in on these nuts that are "shouldered" into the casings.

Price, each - - **26c**

No. 630 Cylinder Head Nut Wrench



This shape of a valve grinder is preferred by some of the "boys." We can supply you.

Price, each - - **20c**

No. 606 Valve Grinder



LUBRICATING THE MODEL T FORD CAR.

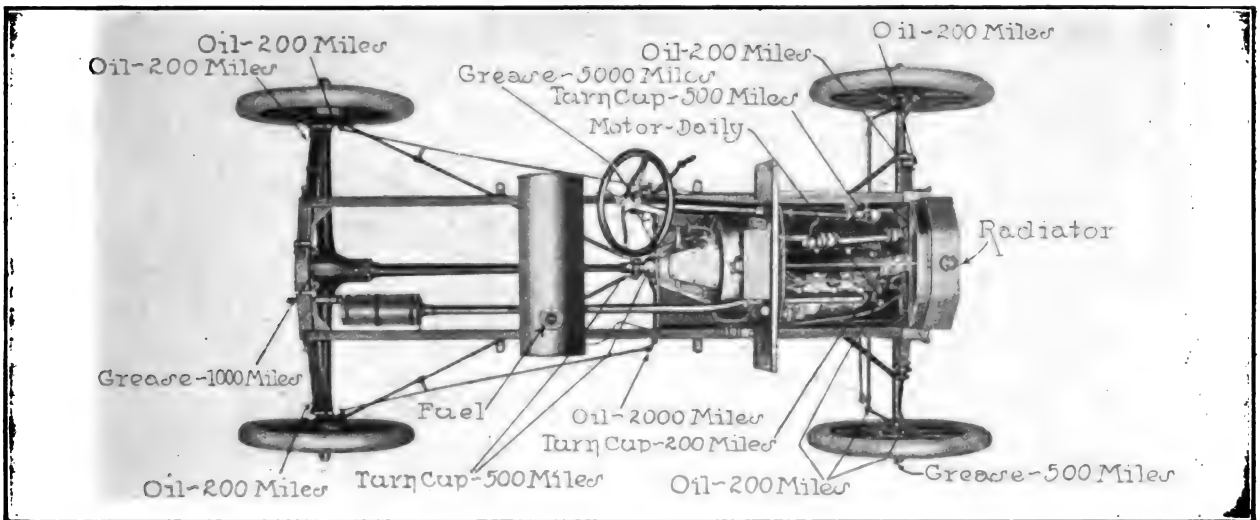
Vehicle Efficiency and Operating Economy Depend Largely Upon Systematic Attention—Mileage Basis the Safe Method for the Inexperienced.

THE purchaser of a Ford car who desires to operate his machine economically, and obtain from it the greatest degree of serviceability, can best serve his own interests by learning to thoroughly lubricate it, and to make adjustments that will be necessary from time to time to prevent wear that will be inevitable unless care is taken to prevent.

Instruction books are supplied with all Ford cars, and these are replete with valuable information, based on experience and compiled in a manner that ought to be a guide for any person of average intelligence. A well founded advice to all buyers of cars is to study the machines.

ometer is a very useful and necessary equipment if only used as a check for the oiling and greasing. The Ford instruction book places high valuation upon such a record, for recommendation is made for lubrication on mileage alone.

The best form of lubrication record is a sheet on which the mileage can be noted each day, on which should be written in groups the different points where lubrication is necessary at stated mileages. When the machine is lubricated either the date or the mileage can be set against each group or each point, but the mileage is best because a glance will show when the next oiling and greasing is needed. The recommendation to



Oiling Chart of the Model T Ford Chassis, with Mileage as the Basis of Lubrication.

This can be done by reading the instruction book and going over the car while studying it so that the detail can be clearly understood. The instruction book will direct attention to every part of the machine that should be lubricated, and if these are located and the needs of each with reference to grease or oil are understood, the owner, although he may not have mechanical experience, will have a sufficient knowledge of lubricating his car to very well protect it.

The certain protection that a Ford car owner can have is a mileage record, which is best obtained by readings from a speedometer. A speed-

oil, for instance, at the end of 200 miles, does not mean precisely that distance. The machine can be driven the number of miles specified with certainty that it will not be damaged through lack of lubrication. Slightly in excess of the mileage would not result in deterioration, but oiling and greasing before the limit set is reached is excellent judgment.

The places where lubrication is necessary are not many, and one can give the required attention in a very short time. For the benefit of those who would care to use a record, the following is suggested:

Lubricate After 200 Miles Driving.

Lubricant	Number	Name of Parts
Oil	2	Front axle, steering knuckle pivots or spindle bolts.
Oil	2	Front spring shackles and bolts.
Oil	2	Yokes of tie rod.
Oil	1	Steering ball socket.
Oil	1	Commutator or timer.
Oil	2	Rear hub brake cams.
Oil	2	Rear spring shackles and bolts.
Turn grease cup	1	Fan hub.

Lubricate After 500 Miles Driving.

Turn grease cup	1	Steering post bracket.
Turn grease cup	1	Universal joint of shaft.
Turn grease cup	1	Driving shaft front bearing.
Grease	2	Front wheel hubs.

Lubricate After 1000 Miles Driving.

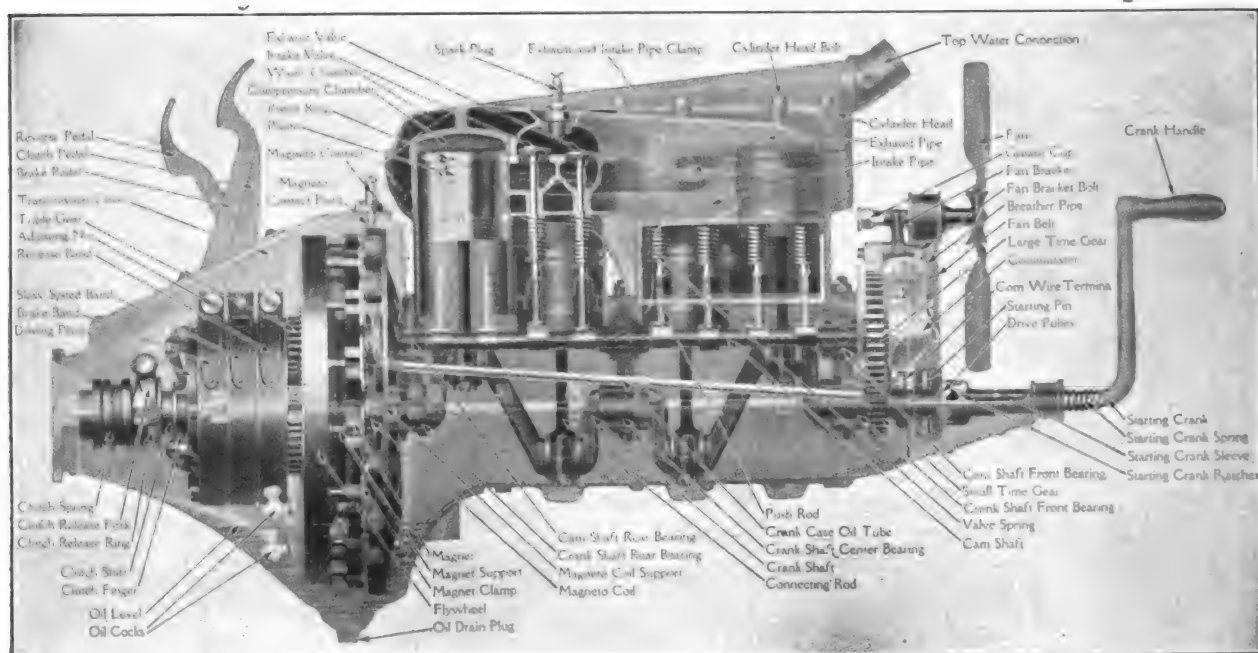
Grease	1	Differential housing.
--------	---	-----------------------

Lubricate After 2000 Miles Driving.

Oil	1	Control bracket.
-----	---	------------------

bearing, is a safe practise to follow. The fourth time filled the cup can be left for the stated mileage interval. Care should be taken to wipe the cups clean before filling, to prevent dust being carried into the bearings, and the oilers can be cleaned with equally good reason.

The driver of any car had best create a formula for giving it attention, so that when oiling and greasing he will start at the right front spring shackle, for instance, and make a complete circuit, ending with the left front spring shackle. This will insure against skipping any one point. One can understand that aside from the greasing of the front wheel hubs, the differential and the steering gear internal gearset, the oil can be ap-



Longitudinal Sectional View of the Ford Motor, in Which the Flywheel Distributes the Lubricant.

Lubricate After 5000 Miles Driving.

Grease	1	Steering gear internal gear case.
--------	---	-----------------------------------

Lubricate Daily.

Oil	1	Motor.
-----	---	--------

Lubricate Occasionally.

Oil	1	Fan belt shaft.
Oil	1	Fan belt puppet.
Oil	1	Crank handle bearing.
Oil	4	Yokes of brake rods.

In referring to the application of lubricant, oiling, means a sufficient quantity to lubricate the bearing parts thoroughly, and turning the grease cups means that these assumedly contain grease. Greasing means packing the bearing or housing until it is filled. The owner can examine the condition of the grease cups, and when these are found low they should be screwed down. Filling and screwing down each cup three times, to insure ample supply of lubricant being in the

plied daily, the grease cups turned slightly, and the machine even better lubricated than if the mileage method is followed.

The ideal attention can be given at the end of the day's or night's driving, which will require but very little time, for conditions will all be favorable. The engine should be wiped clean while it is warm, for the oil or grease and dust accumulated will be soft enough to remove easily. The oil cups should be filled, all the grease cups turned according to the mileage for the day, the fuel supply renewed, the radiator replenished, and the oil in the engine case brought to the required level. The next time the machine is wanted it will be ready for use and the owner will know that it can be driven 200 miles or more with absolute certainty that it will have sufficient



The New BEMUS TIMER FORD CAR TYPE

BEMUS BALL CONTACT TIMER

Every practical man who knows the Ford car recognizes the fact that this short-stroke, high-speed engine requires a Timer capable of rapid, snappy action in the making of contacts and yet having durability sufficient for thousands of miles of running without loss of efficiency.

The Bemus is best for the Ford *because*

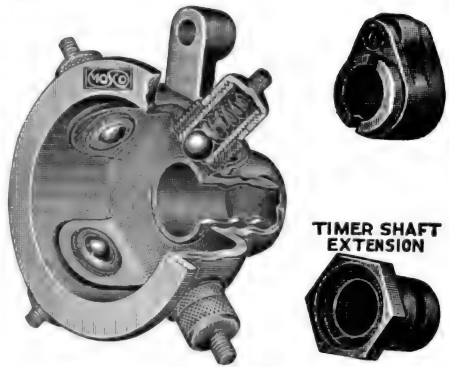
CONTACT is made by a hardened tool-steel brush engaging steel balls with short, glancing impacts, both the brush and the balls turning each time so that fresh contact surfaces are continually engaged.

MOUNTING is direct on the time shaft by means of an extension piece. This brings each of the balls equi-distant from the brush. Result—absolute precision of timing.

STARTING is facilitated in cold weather because these contacts do not hold a body of oil to prevent passage of current.

DURABILITY of unlimited extent is due to a construction which eliminates all wear of the insulation.

The roller brush is reversible, and when worn on both sides may be replaced by the user, together with new contact balls at an expense of a few cents.



PRICE \$2.25



Dial cover **ONLY** removed for filling. This permits filling of tank without removing the device.

We are sole licensees under Rochester Mfg. Co.
Patented Sept. 24, 1912

MOSCO Gasolene Gauge FOR FORD CARS

Complete, Ready to be Inserted in Place of the Usual Filler Cap

The working principle of this gauge is a cork float running on two guide rods and turning a spiralled square rod at the center, the rotation of the central rod causing the indicator hand to sweep the dial. It is undoubtedly the best gauge ever made for the Ford car, as it has a number of advantages not found in others. The device occupies even less vertical space than the present filler cap. No other gauge has so large an opening available for filling. This gauge cannot be injured by the introduction of filling funnels or the nozzles used at filling stations.

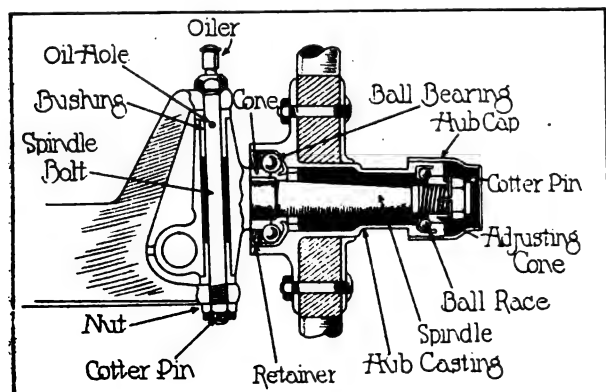
PRICE, \$1.50

MOTOR SPECIALTIES CO.
WALTHAM, MASS.

When Writing to Advertisers, Please Mention The Automobile Journal.

lubrication. There are those who will maintain that the following morning would be a more opportune time, but conditions are never so favorable for work of this kind than directly after use, when less time and labor are necessary. Not only this, in the event of delay of any kind in the morning the car is ready for use.

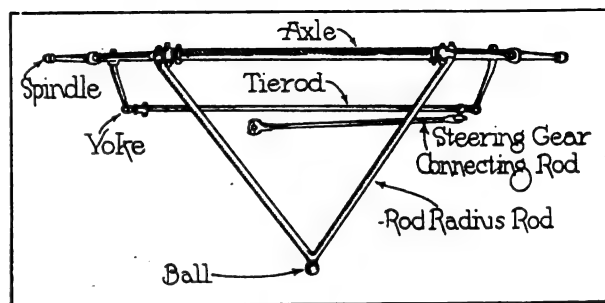
With reference to the lubrication of the motor, daily replenishment is necessary, and the filling must be governed by the two drainage petcocks on the flywheel housing. When the car is new, and until it has been driven 500 miles, the case should be filled until oil will flow from the upper cock, because more lubricant is needed until the engine bearings are "worn in", but after



Sectional View of Front Axle Steering Knuckle, Wheel Spindle and Bearings, Which Are Packed with Grease.

that distance less lubrication is necessary. Then the oil level should be midway between the two cocks, but not under any circumstances so low that it will not flow from the lower cock.

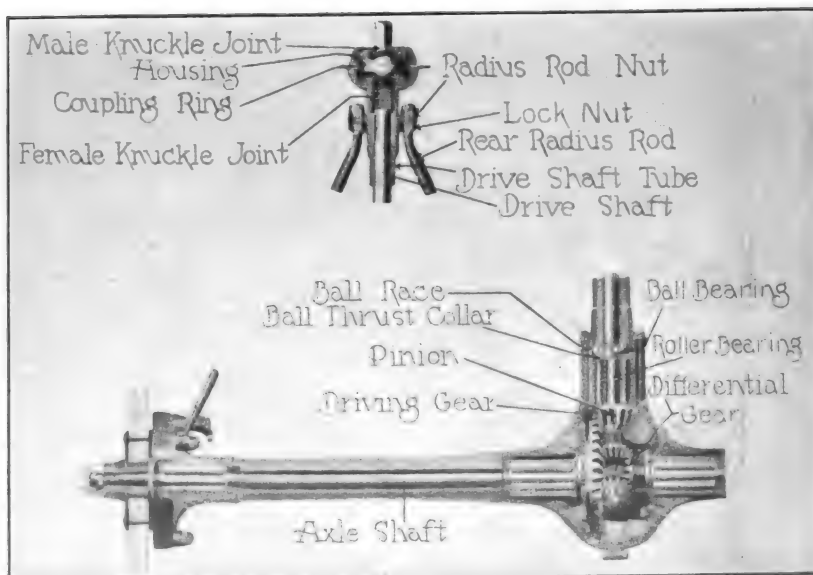
A very safe method of filling is to pour in oil until there is a flow from the upper cock. After this has ceased, draw off the oil from the lower cock. The quantity drawn can be measured. This will show how much is required to fill the case between the two cocks. With any flow from the lower cock half this quantity will afford efficient lubrication. If lower than the lowest cock oil can be poured until there is a flow from it, and then by adding the necessary volume of oil one is certain that the motor can be operated for a considerable distance. But a careful driver will test the oil height if a drive has been long,



The Ford Model T Front Axle, Showing the Radius Rods and the Steering Linkage, Which Require Oil Lubrication.

as there is no reason to take chances when a minute will show the condition of the oil supply.

The systematic attention to oiling and greasing, such as has been described, will so familiarize a man with the normal conditions that he will note whether or not there is wear of any of the moving parts, and he will find that there is usually need of tightening nuts and screws that will slacken, no matter how well they have been set, and these ought to be tightened. Wherever wear will take place, means of adjustment are generally provided. If the wearing results in sufficient play to cause rattle this can be remedied by anti-rattlers, which are usually made to afford spring pressure, or shims can be used, or bushings can be replaced. The play of moving parts is sure to cause wear that will necessitate replacements, and the one certain and practical economy is to make adjustments as soon as lost motion becomes apparent.



Phantom Views of the Ford Driving Shaft Universal Joint, Differential and Driving Axle, Which Are Lubricated by Packing with Grease.

Gray & Davis Headlights

For FORD Cars



\$5

PER PAIR

Greatest Lamp Value Ever Offered

FORD owners can now obtain Gray & Davis headlights at \$5 per pair. Think of it! Our FORD "Special" is a beautiful lamp, highly efficient, embodying Gray & Davis quality in material and workmanship, at prices but little higher than the cost of reflectors alone.

Finish: black body, brass doors. Silver-plated reflectors. Mazda bulbs. Greatest value ever offered. With double bulb (for city driving), one dollar per set additional.

Headlights only, Single bulb, per pair.....	\$5.00	Set, Single bulb and tail light.....	\$6.00
Headlights only, Double bulb, per pair....	6.00	Set, Double bulb and tail light.....	7.00
Tail light separate.....		\$1.00	

Note— We will be glad to supply Ford owners with these lamps direct. Orders should be sent to our executive offices, Boston, accompanied by postal note, money order or certified check.

DEALERS: Write for our interesting "Dealer" proposition.

GRAY & DAVIS, Inc.

BOSTON, MASS.

When Writing to Advertisers, Please Mention The Automobile Journal.

SUGGESTIONS FOR THE NEW CAR OWNER.

The Three-Point Suspension of the Unit Power Plant of the Model T Ford Chassis, The Construction of the Frame and the Method of Springing.

The 18th article of the serial dealing with the construction, operation, care and repair of the model T Ford automobile, explains the three-point suspension of the power plant, the function of the frame and how the springs eliminate road shocks.

THERE are two methods generally used for suspending the motor in the frame of the automobile, which are known as the four and the three-point suspension. With the four-point construction the motor is anchored to the frame at four points, and generally the upper half of the crank case is built with four arms, two on either side. As a rule these arms or extensions are cast integral with the crank case, and are such length that they will extend over the frame.

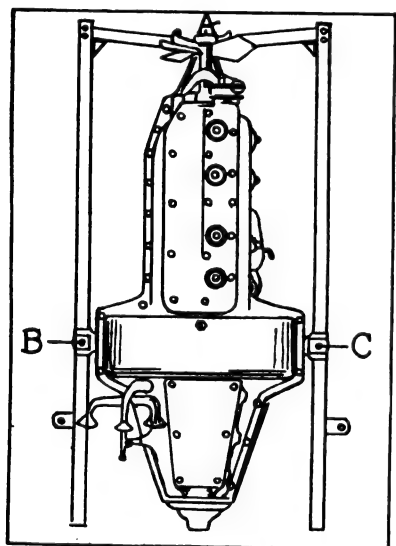


Fig. 36—Illustrating the Three Point Suspension of the Ford Power Plant.

the front wheels passes over a large stone, for example, subject the crank case to undesirable stresses. Because of this the three-point suspension is now generally utilized by manufacturers of motor vehicles, and is used with power plants when the motor, clutch and transmission are a unit.

The power plant of the model T Ford car is a unit construction, and it is suspended at three points, as shown in the illustration at Fig. 36. As may be noted, the drawing is lettered A, B and C, indicating the points at which the motor is

A rigid construction is obtained by bolting these arms to the frame, the bolts passing through the end of the arms and the chassis frame side members.

The disadvantage of this suspension is that any twisting motion of the frame, when the car is traversing a rough road, or when one of

secured in the frame. Rivetted and brazed to either side of the flywheel housing of the power plant is a bracket or arm. These arms rest upon the frame and are rigidly secured by bolts and lock nuts. This arrangement also maintains the alignment of the motor with the transmission.

The third point of suspension A, differs radically from B and C in that while the motor is held firmly in place, its front end or extension of the crankshaft is retained in a bearing much in the same manner as the crankshaft of the engine.

Cast with the lower half of the crank case of the motor is the bearing for the crankshaft, and it rests in what is termed by the maker as the crank case front frame bearing. This bearing is made in two sections, the lower being bolted to the front cross member of the frame, while the upper half, called the crank case front bearing cap, is bolted to the lower member.

From this one will see that a bearing is provided for crankshaft and another for the crank case. This construction permits the frame to move up or down without moving the crank case. For example: When the right wheel is raised six inches, and the left wheel drops two inches, as when in a rut, the frame moves on the crank case bearing, but the motor maintains a horizontal position. All twists imparted to the frame by inequalities of the road are not conveyed to the crank case, as with the four-point suspension.

Frame Assembly.

The frame assembly of the Ford car consists of two side members, parallel with the power plant, a front and rear cross member, frame and body brackets. The material used is pressed steel, and the side members are 101 3/16 inches long, while the cross members are slightly more than 22 inches in length. The side members have a channel section of 1½ inches.

The four corners of the frame are secured and braced by brackets, these being hot rivetted. Attached to the rear frame cross member are the body brackets, and the body is secured to these by bolts.

Spring Assembly.

The springs of a motor vehicle are as a rule constructed of long, flat sections of tempered steel. These metal strips are called leaves.

The type of spring used for suspension of the Ford differs radically from conventional practise, especially the front member. In average practise the frame is supported in front by semi-elliptic springs that parallel the frame side members. The Ford front spring may be termed semi-elliptic springs for the benefit of those not familiar with springs statement should be made that all springs are known in practise by the arc of an ellipse in which they are formed. An ellipse may be described as a flattened circle or oval. When a spring is made of two parts placed one over the other and pivoted at the ends, so that the form is oval shaped, it is termed a full elliptic. A spring composed of one-half of the full elliptic is called a semi or half-elliptic.

Generally the centre of the semi-elliptic spring is secured to axle of the car and the two ends shackled or bolted to the frame. The front spring of the Ford in the position it occupies when attached to the frame is shown at Fig. 37, and as may be noted it is inverted. It consists of seven leaves held together by a tie bolt passing through their centres. As may be noted, spring retainer clips prevent too free a movement of the ends of the leaves.

The spring is secured to a cross member of the frame by spring clips which are U shaped members having threaded ends to take the nuts. These clips are attached near the centre of the spring and when the nuts are tightened secure the spring rigidly to the frame member.

Both ends of the lower leaf of the spring are bent into a small circle, and these are called spring eyes. These eyes are utilized for forming bearings, through which bolts are passed to secure the springs to the axles. The method employed for anchoring the ends of the springs differs from conventional practise in that the parts known as spring perches, and which are shown at Fig. 37, are made in the form of a bolt which passes through the axle and is secured by a nut. The top of the bolt is provided with two eyes, one being utilized to retain the end of the front radius rod while the other forms a bearing for the spring hanger. The last named member is a shackle or link which moves freely with the compression and recoil of the springs. This shackle or link is essential, for on the downward movement of the spring its ends move outward, or in

other words, the spring lengthens. On the recoil the ends of the springs have a tendency to move towards each other. Consequently the shackle controls these movements.

Free movement of the springs ought not to be restricted by the shackles, for the springs are to absorb the variations of pressure upon them aside from that of the suspension load, but the spring movement is necessarily limited. The more resilient and efficient is the spring the greater is the degree of movement. The springs are constantly in action when the vehicle is in use, and riding comfort is dependent upon them.

How Rear Spring Differs.

The rear spring is a single member and differs from the front one in that it has eight leaves and its centre has a decided arch. As previously stated, the rear cross member of the frame is arched and the centre of the rear spring is secured to it by a bar and clips. The spring perches

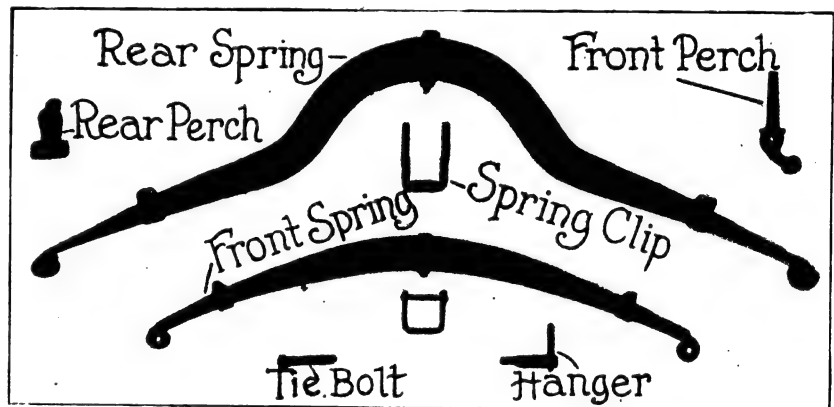


Fig. 37—Showing the Front and Rear Spring Assembly of the Ford Car Which Differs Radically from Conventional Practise.

are similar to the front members, but have but one eye through which the bolt of the spring hanger passes. Both the front and rear perches are fitted with bushings and the bearing surfaces are lubricated by small oil cups. (To Be Continued.)

SCRIPPS-BOOTH CAR LUXURIOUS.

Combining luxury, comfort, appearance and economy, the Scripps-Booth Company, Detroit, Mich., has produced a light car that has created a sensation in the automobile world. At the various motor car shows this model has attracted considerable attention, and when seen at Boston it will be a revelation to many motorists. The Scripps-Booth will occupy space 121 B, and New England motorists will be afforded an extra opportunity to view a light car that gives easy riding and handling in rough places.

WHERE

Is the ONLY PLACE

To Buy

An Auto Body?

**L. M. COTTON, Inc.,
THE BODY SPECIALISTS.**

**922 Commonwealth Ave.,
Boston - - Mass.**

NEW TIRE COMPANY FOR TRENTON.

The Delion Tire Rubber Company, Trenton, N. J., opened its new plant in that city recently. Ex-Governor Stokes of New Jersey delivered an address and some 200 guests from New York, Newark and Philadelphia were present. The officers of the company are: H. H. Coleman, president; F. J. Wetzel, vice president, and George H. Graham, Jr., secretary. The directors include: Manuel Llora, F. C. Hesselman, W. T. Rock, Charles H. Whitehead, L. L. Tompkins, Warren A. Clapp and Lionel Emdin. Mr. Emdin is sales manager of the company, and he will have his headquarters at 1789 Broadway, New York City.

THE HOFFECKER SPEEDLOCK.

The Hoffecker Company, Motor Mart building, Boston, Mass., is marketing a safety device for motor cars known as the Hoffecker Speedlock. This attachment locks the speedometer, so that the car cannot be moved, or sets the maximum speed at a fixed mileage. The speedometer governor controls the Speedlock, which has the same action on the throttle as the control of the

While you are overhauling your car put on a New Lite system, Complete. Chain driven dynamo equipment with storage battery and lamps.

**Price without
lamps**

\$32.75

Price with lamps

\$40.00

F. O. B. factory



You cannot afford to be without a high class electric lighting, ignition and signaling equipment at this price.

**New Lite Manufacturing Co.,
2400 New Lite Bldg., Newton, Iowa.**

driver. It automatically releases the throttle when slower speed is desired, and secures the throttle to an inactive position when the car is left unattended.

The motorist who wants to feel sure about his car's safety, or who desires to set the maximum speed at which his family is to be driven in his absence, will find that the Hoffecker Speedlock has for him great possibilities.

DUPLEX FOUR-WHEEL DRIVE TRUCKS.

The Duplex-Power Car Company, Charlotte, Mich., is manufacturing four-wheel drive trucks of 4000 and 6000-pound capacities. These trucks were submitted to the severest possible test by the United States war department, and after the trials an immediate order was placed by the government for two of these machines. The run made in the test was 100 miles in snow that measured up to the chassis frame at times, and the two machines were each loaded down with 5000 pounds of stone. These trucks are operated in work and conditions that are intended to prove them in every way mechanically perfect, and long endurance is quite as essential as is capacity in army service.

DIXON COMPANY'S NEW BOOKLET.

The Joseph Dixon Crucible Company, Jersey City, N. J., has issued a 16-page booklet describing its graphite automobile lubricants. The cover is in three colors and it pictures the entrance to a garage or supply house, above which the name and address of any Dixon dealer will be printed. The first four pages are devoted to a brief but pointed address to those interested in graphite lubrication, and following this is an individual description of the members of the Dixon lubricant family.



A distinctive feature of this description and one that removes the commonplace, is the use of a series of well drawn pen and ink sketches that serve the triple purpose of showing the "which, where and how" of Dixon's graphite automobile lubricants. The latter part of the booklet is devoted to recommendations for the use of each lubricant. The booklet is well worth writing for and a request will bring it gratis.

SPIT FIRE MOTHER GOOSE BOOK.

A. R. Mosler & Co., New York City, makers of the well known Spit Fire, Vesuvius and Superior spark plugs, has published a book containing the Mother Goose rhymes in a new way. These are made to do the duty of advertising the Mosler products, and the rhymes are illustrated throughout. In addition to this, the 24-page book contains a complete list of American pleasure cars with spark plug sizes, also the proper Mosler plugs to use on them.

In addition, the Mosler Company has issued a chart containing the names of every car, commercial or pleasure, manufactured, and the size of the spark plug to use in connection with it. Motorcycles are also included in the list. The book is well worth the car owner's time, and the chart will be sent to dealers or garage men who ask for it. At the top of the chart is a series of pictures showing the complete line of Mosler plugs.

LENOX UNDER NEW MANAGEMENT.

The Hotel Lenox, which has for a number of years been known as one of the most popular hostelrys of Boston, and which has been recognized as headquarters by the motorists of New England, recently passed into the management of

Mr. L. C. Prior, who has had long experience in hotel administration, and who has plans which will undoubtedly make the Lenox even more favorably known. The hotel has for several years been the place of assembly of the Bay State Automobile Association and it has been very largely patronized by the trade, for it is located in the automobile district of the city.

The Lenox is at Exeter and Boylston streets, very convenient to the New Haven and Boston & Albany stations in the Back Bay, is extremely accessible to all the trolley lines and the Boylston street subway, and all motorists entering the city by road must pass it. It is within a block of the Mechanics' building, where the Boston automobile show will take place, and it will naturally attract to it a very large show week patronage. Manager Prior has completely renovated the hotel, has made every provision for the comfort and convenience of his guests, and has a cuisine that is said to be unsurpassed.

SPECIAL COTTON BODIES.

An exhibit of special interest will be made during the Boston automobile show by L. M. Cotton, Inc., 922 Commonwealth avenue, Boston, Mass., builder of freight carrying bodies of all types and agent for one of the best known builders of pleasure car bodies. This exhibit will be seen at spaces 331, 332, 333 and 334, in the basement, close to the stairs from Machinery hall. The display will include a number of the standard Cotton bodies, which are designed, constructed and finished to meet any haulage requirement, and in addition there will be a special limousine body made for installation on Ford chassis. The material, workmanship and finish of these bodies are said to be high class in every respect, and they have every adjunct that make for comfort and pleasure in motoring.

MILLER TIRES AT BOSTON SHOW.

The Miller Rubber Company, Akron, O., has been prominent at all recent shows, and it will have an exceptionally fine exhibit at booth 434 during the Boston show week. In every principal city a Miller distributor will be found, and the Miller tire is recognized by the discriminating motorist as a quality and economical product.

The Studebaker Corporations, Detroit, Mich., declared its regular quarterly dividend of 1¾ per cent. on its preferred stock, payable March 1 to stock of record Feb. 20.

VANDERBILT CUP RACE POSTPONED.

OWING to a heavy rainstorm on the night of Feb. 21, the Vanderbilt Cup race, that was to take place through the Panama-Pacific Inter-

list for these two classics plainly shows that they have recovered their old-time popularity. The 1915 Vanderbilt Cup race may be the final race for the trophy donated by William K. Vanderbilt, Jr., as it is possible for a three-time winner to materialize. Ralph De Palma has won the cup race twice in succession, and should he win again this year the cup, which was donated in 1904, will be awarded to the noted Italian driver. In 1909 and 1910 Grant in an Alco won two successive races, but in 1911 Mulford, in a Lozier, carried away first honors. In the following year De Palma won first place, and again won in 1914, there being no race in 1913.



Ralph De Palma, Twice Winner of the Vanderbilt Cup, in the Mercedes with Which He Will Try for a Third Successive Victory.

national Exposition, San Francisco, Cal., on Washington's birthday, was postponed until March 6. Early the morning of the 22nd the weather was very uncertain and in hope for improvement the time for the start was delayed. The course was a quagmire when the sun arose, and at 9 o'clock announcement was made that the race would be started at 12 noon, instead of 10 o'clock, as originally fixed.

But at 11 o'clock rain again fell heavily, so that it was necessary for a further postponement. As now planned the Grand Prize race will be competed on Feb. 27, and the Vanderbilt Cup the following Saturday. The biggest field of entrants that ever competed for the Vanderbilt Cup was ready for the start. There were 34 cars in the final line-up, and more than 100,000 spectators had gathered despite the rain.

Regarding the postponement, W. L. Houghson, special racing commissioner, said: "I don't believe the public desires that the drivers risk their lives on a course as dangerous as this is today. The drivers were willing to go ahead, but we decided to postpone the race".

The record-breaking entry

Eddie Pullen, holder of the world's road race record, and winner of last year's Grand Prize race, is a favorite for that event this year. As in the 1914 race, Pullen will pilot a Mercer, he being one of the Mercer team of three. The other two Mercers will be driven by Ruckstall and Nikrent. The Stutz team will be Gil Anderson, Earl Cooper and Howard Wilcox, and with the wonderful showing these cars and drivers made the past year, many confidently predicted that one of the Stutz trio will be a leader, if not a winner.

The Maxwell team is watched with interest, as these cars have made two no-stop records within the past two months with Barney Oldfield at the wheel of one and Billy Carlson pilot-



Eddie Pullen, Winner of the 1914 Grand Prize, in the Mercer He Will Race in the Same Event This Year.

ing the other. A third Maxwell has been entered, and Eddie Rickenbacher has deserted the Duesenberg team to handle it. Paul Hale Bruske,

will meet with a new road condition, for except for a stretch of about three-quarters of a mile at one end, the course has a surface of newly laid asphalt. The asphalt course is new in road or track racing, and conditions may develop with which the drivers are not familiar. From statements made by the drivers who have tried the course there is reason to believe the asphalt will be exceptionally fast. A condition not wholly understood will be met on the turns and curves, for it may be that oil upon the asphalt may create danger that is not known until the cars reach these places. However, the racing committee promises to have men stationed at all turns, and these will be sprinkled with sand whenever necessary. The



Barney Oldfield, "Master Driver of the World", in the Maxwell He Will Pilot in the Exposition Races.

contest manager of the Maxwell Company, states that these cars are measuring up to the expectations of their creator, Ray Harroun, and with three of the best drivers in the country at the wheels the Maxwell performance will be notable.

Louis Disbrow will be seen in a Simplex and Caleb Bragg has entered a Californian. In addition to the three full teams mentioned above, the Stutz, Mercer and Maxwell, the Case, Duesenberg, Chevrolet and Peugeot each have two cars entered in the two races. The drivers in the 1915

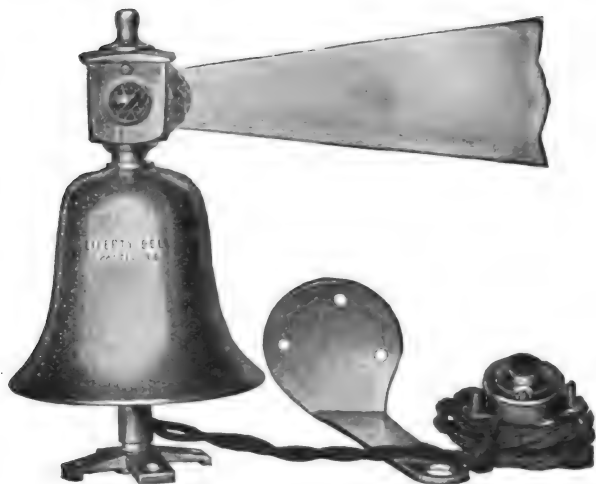
right angle turns are the only obstacles to high speed, as they cannot be taken faster than 45 miles an hour. The majority of the drivers will probably drive slower than that pace to be safe. These two right angle turns are at the extreme end of the course, located on the Avenue of Progress, and are the only points on the 3.9-mile circuit where brakes will have to be applied.

There are two long straightaways, and the grandstand is located on the start and finish point.



Three of the Vanderbilt Cup and Grand Prize Favorites—Reading from Left to Right They Are: Eddie O'Connell, Duesenberg; Billy Carlson, Maxwell, and Tom Alley, Duesenberg.

A Liberty Bell Gives Traffic Freedom



No. 2—With eagle, \$12; with red light, \$14
 No. 1—With eagle, \$10; with red light, \$12
 No. 1—Special, \$7.50

AN electric warning signal to eye and ear. A handsome addition to a car, and a positive alarm by day or night.

Can be mounted on the radiator, guards or placed under the hood. May be operated by hand or foot, and from any battery connection.

The Liberty Bells are made in three sizes, adaptable to any vehicle.

Sold by your dealer or direct. We have a splendid dealers' selling proposition.

THE LIBERTY BELL CO., THE ARCADE CLEVELAND, OHIO

Trade Names

All Industrial names ready at instant notice. All lines separate.

The Most Complete List of Trade Names Known

100% ACTIVE

Write for particulars

ACCESSORY AND GARAGE JOURNAL

Times Building, Pawtucket, R. I.



BALL BEARINGS REGROUND
 at one-fifth the cost of new, also New Single Row Annular, Thrust, New Departure Double Row and Radax Bearings.

AHLBERG BEARING CO.

Boston
 New York

Chicago
 Los Angeles

Detroit
 Cleveland

VALVOLINE OIL CO.

Heavy, Medium and Light

Automobile Oils

27 STATE STREET BOSTON, MASS

American Made for American Trade

New Departure

Ball Bearings

THE NEW DEPARTURE MFG. COMPANY,
 BRISTOL, CONN.

Subscribe for

The Accessory and Garage Journal
 The Trade Authority \$2.00 the year

When Writing to Advertisers, Please Mention The Automobile Journal.

It PLUGS the hole and It HUGS the hole

Send for the New Rubber

SAMPSON REPAIR PLUG

For Automobile Inner Tubes.

Instantly Cures the Puncture and Leaves No "Lump"

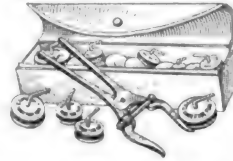
Eliminates the Carrying of Several Extra Tubes and Cuts Down the Cost of Repair to a Minimum. No Cumbersome Tools or Heating Irons Necessary—Only One Small Tool and Your Bare Hands.

The Big Tire Feature of 1915

Aroused great interest at the New York and Chicago Automobile Shows—a pliable rubber plug with a metal core—feathers out at the edge and becomes an integral part of the tube. Not an experiment of a novice, but the tested invention of a tire expert. Tested in tubes for upwards of 7000 miles and never found wanting. Good for 30,000 miles if the tube is.

No Cement No Cleaning No Waiting

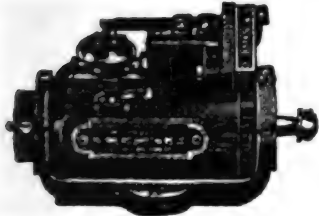
An instant roadside repair as permanent as vulcanizing. Utilizes the same principle used in fastening the valve stem in the tube—and positively cannot bite or chafe. Remit price direct, if your dealer hasn't yet stocked it. Booklet mailed free.



PRICES:—No 1, Sampson Repair Kit, Containing 1 Tool and 1 Doz. Assorted Plugs, \$2.50. No. 2, Sampson Carton Kit, Containing 1 Tool and 1-2 Doz. Assorted Plugs, \$1.50.

STEVENS & COMPANY,

375 Broadway, New York



Mea
Magneto
S. R. O. BALL BEARING

MARBURG BROS., Inc.,

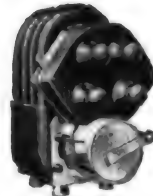
Sole Importers

Detroit

1790 Broadway, New York

Chicago

Model BX-4



HEINZE



HEINZE MAGNETOS have proven superior in all competitive tests. This superiority is your guarantee of FREEDOM from ignition troubles.

HEINZE ELECTRIC COMPANY

Sales Offices—Detroit, Michigan.

Factories—Lowell, Mass.

Service Stations—New York, Detroit, Chicago, Minneapolis

DIXON'S GRAPHITE GREASE

For Transmissions and Differentials

Booklet No. 210

Made in JERSEY CITY, N. J., by the
JOSEPH DIXON CRUCIBLE CO. (4)

\$485 Salvador Car \$485

Four-Cylinder, Water-Cooled Unit Power Plant with Three Speed Selective Transmission and Shaft Drive. The Quality and Equipment of the High-Priced Car at Cyclecar Price.

SALVADOR MOTOR CO., 126 Massachusetts Avenue
Boston, Mass.

F. SHIRLEY BOYD

175 Massachusetts Ave., Boston, Mass.

R. I. V. Ball Bearings.

Baldwin Chains and Sprockets.

J. H. Sager Line.

**PAIGE "36"—\$1195
"25"—\$ 925**

Leaders of popular-priced cars—thoroughly built, completely equipped, backed by a strong organization. Specifications and catalog on request.

PAIGE-DETROIT MOTOR CAR CO.
Detroit, Michigan

When Writing to Advertisers, Please Mention The Automobile Journal.

New BETTER AND QUICKER Way TO SCRAPE BEARINGS

Did You Ever Spend Three to Five Days in
"HAND SCRAPING"

In a set of main bearings and then get an unsatisfactory PRINT? DON'T DO IT AGAIN. Use a scientific and accurate method.

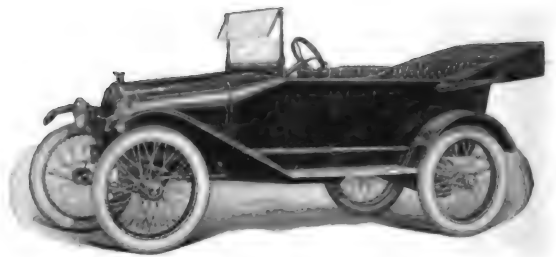
USE THE

Martell Aligning Reamer A Motor Finished Every Day

and the bearings will outlast the hand scraped bearings many times over.

See it demonstrated at our exhibit at Boston Auto Show, Space 544—department F (restaurant floor).

Harding Distributing Co.
Boston, Mass., U. S. A.



METZ '25'

The Quality Car

\$600 Touring Model, Equipped Complete, Including Gray and Davis Electric Starter and Electric Lights.

Dealers everywhere are showing a lively interest in this latest METZ model. They realize the increasing tendency of the public to seek both **quality and completeness** of equipment in a low-priced car, and they are not blind to the fact that the new METZ fully meets this demand. It embodies all the leading features found in other high-grade cars, and, in addition, certain exclusive advantages which they do not possess. The new METZ Roadster is a big winner, too, at \$495.

Write for liberal terms and new catalogue "Q".

METZ COMPANY, WALTHAM, MASS.

For Your 1915 Lubricant Decide Upon



Reduced prices (due to the perfection of new automatic machinery which reduces our cost of manufacturing) NOW enable you to use NON-FLUID OIL on your LOWEST price cars as well as your highest, at practically the same price that you are asked for greases, and the inferior substitutes that have followed in the wake of NON-FLUID OIL'S success. No matter what lubricant you have heretofore used, NON-FLUID OIL will lubricate BETTER and MORE ECONOMICALLY. Get a can now, try it on your own car and note the improvement.

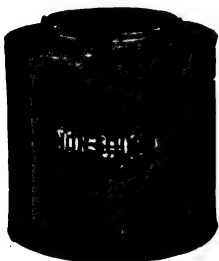
"K. No. 00 Special" grade for sliding gear transmission.

"K. No. 000" for differential, compression cups and all bearings.

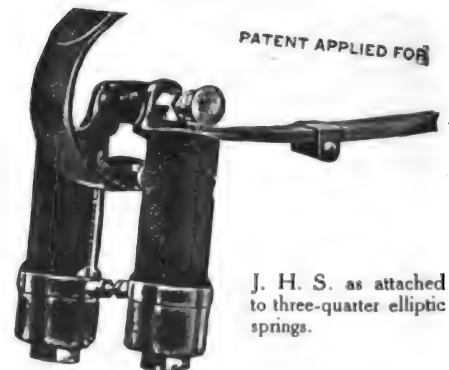
Sold by leading dealers everywhere. Look for the orange-colored can bearing sprocket-wheel trade-mark shown above.

**New York & New Jersey
Lubricant Co.**

165 Broadway, New York
1430 Michigan Avenue, Chicago, Ill.



J. H. S.



J. H. S. as attached
to three-quarter elliptic
springs.

Backed by ten years of success in
the manufacture of shock absorbers.

**Indispensable for Comfort
and Economy of Upkeep**

Price \$25.00—ANY CAR

30 Days' Free Trial—Year Guarantee

J. H. SAGER CO., 271 South Ave., Rochester, N. Y.
New England Distributor

F. SHIRLEY BOYD, 175 Massachusetts Ave., Boston, Mass.

When Writing to Advertisers, Please Mention The Automobile Journal.

Meet me at the
Tuller

For Value,
Service, Home
Comforts



New HOTEL TULLER

Detroit, Michigan

Center of business on Grand Circus Park. Take Woodward car
get off at Adams Avenue.

ABSOLUTELY FIREPROOF

200 Rooms, Private Bath, \$1.50	Single, \$2.50	Up, Double
200 " " " 2.00	" 3.00	" "
100 " " " 2.50	" 4.00	" "
100 " " " 3.00 to 5.00	" 4.50	" "

Total 600 Outside Rooms. All Absolutely Quiet.
Two Floors—Agents' New Unique Cafes and
Sample Rooms Cabaret Excellent

20,000 GUARANTEED

When you have anything to say to those in the auto-
mobile industry use straight trade talk copy in the

Accessory and Garage Journal

The only strictly automobile trade paper published
in America

Automobile Journal Publishing Co.

Publishers

AUTOMOBILE JOURNAL **MOTOR TRUCK**
Times Building, Pawtucket, R. I.

Tarvia

**PREVENTS DUST
PRESERVES ROADS**

Booklets on request

BARRETT MANUFACTURING CO.

New York, Chicago, Philadelphia, Boston, St. Louis, Cleve-
land, Pittsburg, Cincinnati, Kansas City, Minneapolis, Seattle,
Birmingham, Ala.



Studebaker

FOUR Roadster, \$985 SIX 5-passenger Touring Car, \$1385
FOUR Touring Car, \$985 SIX 7-passenger Touring Car, \$1450

All models electrically started and lighted and completely equipped.

STUDEBAKER - **DETROIT, MICH.**



MOTORISTS

and

DEALERS

will find the

ANSWER

to the

NON SKID QUESTION

**In The Saturday
Evening Post
on Feb. 25th**

(When Writing to Advertisers, Please Mention The Automobile Journal.)



"Don't Gamble With Safety!"

The Real Test of Brake Lining is SERVICE

Every dealer and public garage owner can make a service test of S-M-C brake lining that must prove its qualities and merits as the best lining that can be produced.

The dealer is the judge,—if the lining is not satisfactory, we refund the purchase price and in addition, 10% interest.

(IMPROVED)



S-M-C brake lining is sold with the manufacturer's guarantee that it will give satisfaction to every purchaser—that it will give results equal to those obtained by the dealers and garage owners from their own service tests.

The customer decides the measure of satisfaction. If not in every way satisfied the purchase price is refunded.

S-M-C BRAKE LINING

Is composed of asbestos fabric woven with brass wire, treated with a compound and consolidated by steel rolls. It is heat, oil and water resisting and will endure in all conditions of service. It is absolutely uniform in quality. It is produced in all standard widths and thicknesses.

A SPECIAL LINING FOR FORD CARS

The S-M-C dealers' proposition is the soundest and broadest ever offered to the trade. The S-M-C Trade Service Specializes Quick Delivery

"SOMETHING MOR'N COTTON."

STAYBESTOS MFG. CO.

Germantown, Philadelphia, Pa.

Makers of

Asbestos and Rubber Packings, Gaske's and Radiator Hoses

Classified Buyers' Guide.

ACCESSORY MANUFACTURERS AND JOBBERS.

Alsten & Goulding Co., Worcester, Mass.
Auto Parts Co., Providence, R. I.
Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.
Times Square Auto Co., 56th St., at Broadway, New York City.

AIR COMPRESSORS AND TANKS.

Brunner Mfg. Co., Main Office and Factory, Utica, N. Y.; New York Office, Hudson Terminal Bldg., 30 Church St. (Brunner)
Williams Foundry & Machine Co., Akron, O.

ARBOR PRESSES.

Bartlett, Edwin E., 322 A St., Boston. (Greenerd.)

AUTOMOBILES. (See Cars.)

AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

Motor Specialties Co., Waltham, Mass.

BALLS AND BALL BEARINGS.

Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1790 Broadway, New York City; 805 Woodward Ave., Detroit.
Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (R. I. V.)
Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)
New Departure Mfg. Co., Bristol, Conn. (New Departure.)
Norma Co. of America, 1790 Broadway, New York City. (Norma.)

BATTERIES.

Gelsaler Bros. Storage Battery Co., 514 W. 57th St., New York.

BODIES—WOOD AND METAL.

Highland Body Mfg. Co., Cincinnati, O. (Highland.)
Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

BRAKE BANDING OR LINING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston, Mass. (Multibestos.)
Royal Equipment Co., 1378 Bostwick Ave., Bridgeport, Conn. (Raybestos.)
Russell Mfg. Co., Middletown, Conn. (Rusco.)
Standard Woven Fabric Co., Framingham, Mass. (Multibestos.)
Staybestos Mfg. Co., Lena and Armat Sts., Germantown, Philadelphia, Penn. (Staybestos.)

BRUSHES, WIRE.

Williams Foundry & Machine Co., Akron, O.

BUMPERS AND FENDERS.

Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Diamond.)

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARBURETORS.

Air-Friction Carburetor Co., Dayton, O. (Model C.)
Findelsen & Kropf Mfg. Co., 2127 Rockwell St., Chicago. (Rayfield.)

Zenith Carburetor Co., Detroit. (Zenith.)

CARS—GASOLINE PLEASURE.

Cole Motor Car Co., Indianapolis, Ind. (Cole.)
Inter-State Motor Co., 804 West Willard St., Muncie, Ind. (Inter-State.)
Mets Co., Waltham, Mass. (Metz.)
Nordyke & Marmon Co., Indianapolis. (Marmon.)
Paige-Detroit Motor Car Co., Detroit. (Paige.)
Peerless Motor Car Co., Cleveland, O. (Peerless.)
Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Salvador Motor Co., Farragut Bldg., Massachusetts Ave., Boston. (Salvador.)

Scripps-Booth Co., Detroit. (Scripps-Booth.)

Studebaker Corp., Detroit, Mich. (Studebaker.)

Stutz Motor Car Co., Indianapolis. (Stutz.)

Velle Motor Vehicle Co., Moline, Ill. (Velle.)

White Co., Cleveland, O. (White.)

Willys-Overland Co., Toledo, O. (Overland.)

Winton Motor Car Co., 131 Berea Road, Cleveland, O. (Winton.)

CARS—GASOLINE COMMERCIAL.

Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)

Driggs-Seabury Ordnance Corp., Sharon, Penn. (Vulcan.)

When Writing to Advertisers, Please Mention The Automobile Journal.

(BUYERS' GUIDE—Continued.)

Federal Motor Truck Co., Junction and Leavitt Sts., Detroit. (Federal.)
General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
Gramm-Bernstein Co., Lima, O. (B. A. Gramm's.)
Independent Motors Co., Port Huron, Mich. (Independent.)
Lauth-Juergens Motor Car Co., Fremont, O. (Lauth-Juergens.)
Palmer-Moore Co., Syracuse, N. Y. (Palmer Moore.)
Peerless Motor Car Co., Cleveland, O. (Peerless.)
Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
Sanford Motor Truck Co., Syracuse, N. Y. (Sanford.)
Signal Motor Truck Co., Detroit. (Signal.)
Studebaker Corp., Detroit, Mich. (Studebaker.)
Sullivan Motor Car Co., Rochester, N. Y. (Sullivan.)
White Co., Cleveland, O. (White.)

CARS—ELECTRIC COMMERCIAL.

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

CEMENTS.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y. (Sta-Fix Radiator Mend.)

"X" Laboratories, Boston. (X Radiator.)

CHAIN LUBRICANTS.

Motor Accessories, Inc., 749 A Boylston St., Boston. (Chain-Lub.)

CHAINS, TIRE, AND ANTI-SKIDDING DEVICES.

Weed Chain Tire Grip Co., 28 Moore St., New York. (Weed.)

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

CIGAR LIGHTERS. (See Lighters.)**COILS.**

Heinze Electric Co., Lowell, Mass.

CYLINDER CLEANING COMPOUND.

Bowling Green Sales Co., 42 Broadway, New York City.
Dyer Apparatus Co., Cambridge, Mass. (Oxy-Carbon.)

DRESSINGS, TOP AND LEATHER.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

ELECTRIC LIGHTING EQUIPMENT.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FIRE EXTINGUISHERS.

Pyrene Co. of N. E., 88 Broad St., Boston.

FORD AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

Russell Mfg. Co., Middletown, Conn.

FORD STARTERS.

Hunter Auto Supply Co., Hunter Bldg., 333 W. Madison St., Chicago, Ill. (Hunter.)

FUNNELS, AUTO.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind. (Ross.)

GENERATORS.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

GUNS, GREASE. (See Pumps, Oil and Grease.)

HEADLIGHT DIMMERS.

Chaney Co., L. F., Springfield, O. (Chaney.)

HEATERS.

Superior Mfg. Co., N. S. Pittsburg, Penn. (Superior Safe Garage.)

HORNS.

Garford Mfg. Co., Elyria, O. (Tuto.)

JACKS.

Motor Specialties Co., Waltham, Mass. (Excel Auto.)

When Writing to Advertisers, Please Mention The Automobile Journal.



Bosch

**Bosch
Magnetos**

have unequalled service, both in them and behind them. It's worth your while to see that the car you sell or buy has a Bosch—"Magneto Service" Ignition.

Be Satisfied. Specify Bosch

Correspondence Invited
BOSCH MAGNETO CO.
 204 W. 46th St., New York
 250 Service Stations

THE MOTOR TRUCK

A Recognized Authority in the
Commercial Vehicle Field

12 ISSUES

\$2.00 THE YEAR

REXO II \$3⁸⁵

The GARFORD MANUFACTURING COMPANY, 2546 Ohio St., ELYRIA, O.
 Successors to THE DEAN ELECTRIC COMPANY.

TEAR OUT AND SEND

This Ad Saves \$1.00

Send this ad, your dealer's name and \$4.00 and receive four (4) Bethlehem Five Point Spark Plugs "Guaranteed for the life of the Car". Regular price \$1.25 each. State car and model. Address—

The Silvex Co., A. J., 171 Madison Ave., New York



BRAKE LINING

The Ideal Brake Lining for All Types of Motor Vehicles. It Is Sold with the Fullest Guarantee for Quality, Service and Satisfaction.

Innumerable Tests Have Proven Its High Resistance to Wear and Its Efficiency for Braking, Heat-Resisting, Slow Wearing, Shock-Reducing and Safety Insuring. It Has No Equal.

Made in All Sizes to 9 Inches Width and 1/2-Inch Thickness.

Sold by Leading Dealers Everywhere, or Direct if Your Dealer Is Not Stocked. Dealers' Samples, Price List and Trade Discounts Allowed. Sent at Request. Special Attention Given Owner's Orders.

Russell Manufacturing Co.
Middletown, Conn.

The John V. Wilson Company, New England Selling Agent, 22 Motor Mart, Boston, Mass.

Write for full particulars



Why Freeze Yourself?
Ruin Your Auto?

The Superior
Safe Garage Heater

SAFE. NO FUMES.
NO GASES

Equipped with pilot light. No matches, no danger, no discomfort. An ideal positive heater.

SUPERIOR MANUFACTURING CO. N. S. Pittsburgh, Pa.

Peerless Quality in Smaller Size
"ALL PURPOSE" FOUR AND SIX
FOUR AT \$2,000 (Sixes \$250 Extra)
THE PEERLESS MOTOR CAR CO., CLEVELAND, OHIO
Makers also of the "48-Six" and Peerless Trucks.
Licensed under The Kardo Patents.

AUTOMOBILE ELECTRIC LIGHTING SPECIALTIES

For the Automobile Owner and Manufacturer
who wants SERVICE for his money

ELECTRIC LIGHTING SPECIALTIES Made to Order
CULVER-STEARN'S MFG. CO.
Worcester, Mass. Detroit, Mich.

When Writing to Advertisers, Please Mention The Automobile Journal.

(BUYERS' GUIDE—Continued.)

LAMPS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric Trouble.)

Mueller & Co., R. 8., 431 High Ave., S. E., Cleveland, O. (Clamp.)

LIGHTERS, CIGAR.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)

LIGHTING SYSTEMS, ELECTRIC.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Garford Mfg. Co., Elyria, O. (Dynalux.)

LUBRICANTS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)

Continental Asbestos Corp., Worcester, Mass. (Spedolene.)

Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)

Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagle-line No-Karbon.)

Harris Oil Co., A. W., 326 So. Water St., Providence, R. I.; 143 No. Wabash Ave., Chicago. (Harris.)

New York Lubricating Oil Co., 116 Broad St., New York City. (Monogram.)

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MotoRol, Non-Fluid, Kelex.)

Standard Oil Co., New York. (Polarine.)

Texas Co., The, 17 Battery Place, New York City. (Texaco.)

Vacuum Oil Co., Rochester, N. Y. (Gargoyle Mobiloil.)

Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.

Eisemann Magneto Co., 32 33d St., Brooklyn, N. Y. (Eisemann.)

Heinze Electric Co., Lowell, Mass. (Heco.)

Marburg Bros., 1790 Broadway, New York. (Mea.)

Spiltdorf Electrical Co., 98 Warren St., Newark, N. J.

MAILING LIST.

Trade Circular Addressing Co., 166 W. Adams St., Chicago.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

MOTORS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Michigan.)

MOTOR STARTERS.

Automatic Appliance Co., 172 Columbus Ave., Boston. (Boston.)

PATCHES, TIRE.

Braender Rubber & Tire Co., Rutherford, N. J. (Cementless.)

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

POLISH.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

PRESSES. (See Arbor Presses.)

PUMPS, TIRE.

Kellogg Mfg. Co., Rochester, N. Y. (Kellogg.)

RADIATOR CEMENT. (See Cements.)

REAMERS.

Harding Distributing Co., Boston. (Martell Aligning.)

RINGS. (See Piston Rings.)

ROAD BUILDING MATERIALS.

Barrett Manufacturing Co., New York. (Tarvia.)

ROLLER BEARINGS.

Hyatt Roller Bearing Co., Detroit. (Hyatt.)

Norma Co. of America, 1790 Broadway, New York City. (Norma.)

SEATS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Racing.)

SELF-STARTERS. (See Motor Starters.)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Sager Peerless.)

Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Peerless.)

(BUYERS' GUIDE—Continued.)

SPARK PLUGS AND IGNITERS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)
 Bosch Magneto Co., 223-225 W. 46th St., New York.
 Helms Electric Co., Lowell, Mass. (Heco Priming.)
 Milwaukee Auto Specialty Co., 705-711 Chestnut St., Milwaukee, Wis. (Centerfire.)
 Splitdorf Electrical Co., 98 Warren St., Newark, N. J.

SPRINGS FOR AUTOMOBILE SUSPENSION.

Marburg Bros., Inc., 1790 Broadway, New York. (Marburg-Hagen.)
 Tuthill Spring Co., 776 Polk St., Chicago. (Titanic Unbreakable.)

SPROCKETS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

TEST CLIPS.

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Universal.)

THERMOS CASES.

Dover Stamping & Manufacturing Co., Cambridge, Mass.

TIMERS.

Motor Specialties Co., Waltham, Mass. (Bemus.)

TIRE ACCESSORIES.

Braender Rubber & Tire Co., Rutherford, N. J.
 Stevens Mfg. & Supply Co., Fisher Bldg., Chicago. (Stevens Valves.)

TIRE CHAIN GRIPS. (See Chains.)

TIRE PRESERVATIVES AND PROTECTORS.

Braender Rubber & Tire Co., Rutherford, N. J.

TIRE REPAIR EQUIPMENT.

Stevens & Co., 373 Broadway, New York City. (Sampson Inner Tube Plug and Outfits.)

TIRES, CASINGS AND INNER TUBES.

Braender Rubber & Tire Co., Rutherford, N. J. (Braender.)
 Federal Rubber Manufacturing Co., Milwaukee, Wis. (Federal.)
 Goodyear Tire & Rubber Co., Madison St., Akron, O. (No-Rim-Cut.)
 Lax-Fal Rubber Co., Dept. S, 77 Chambers St., New York City. (Lax-Fal Guaranteed.)
 Miller Rubber Co., Akron, O. (Miller.)
 Polack Tyre & Rubber Co., 246 W. 59th St., New York City. (Polack.)

TOPS AND ATTACHMENTS.

Highland Body Manufacturing Co., Station P, Cincinnati, O. (Highland Coupe.)
 Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

TRUCKS AND TRACTORS. (See Cars, Commercial.)

VALVE LIFTERS AND RESEATERS.

Paro, H. G., Suite 718-719 Michigan Blvd. Bldg., 30 No. Michigan Blvd., Chicago.

VALVES, TIRE.

Stevens Mfg. & Supply Co., Fisher Bldg., Chicago. (Stevens.)

VALVE TOOLS.

American Valve Tool Co., Stamford, Conn. Box 27.

VARNISHES, ETC.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

VULCANIZERS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)
 Vanderpool Co., Springfield, O.
 Williams Foundry & Machine Co., Akron, O.

WELDING OUTFITS.

Dyer Apparatus Co., Cambridge, Mass. (Dyer.)
 Waterhouse Welding Co., 3 Pelham St., Boston, Mass.


WHEELS, WIRE.

Houk Mfg. Co., 1709 Elmwood Ave., Buffalo, N. Y. (Houk Detachable.)

WRENCHES AND COMBINATION OUTFITS.

Coe's Wrench Co., Worcester, Mass.
 Lane, Will B., 180 No. Dearborn St., Chicago. (Unique Ratchet.)
 Mossberg Co., Frank, Attleboro, Mass.

When Writing to Advertisers, Please Mention The Automobile Journal.



REG. U. S. PAT. OFFICE

Magneto ignition is highest grade equipment—saves you money every mile you ride and increases the efficiency of your car

SPLITDORF ELECTRICAL CO.
 NEWARK, NEW JERSEY

FREE
 on
Request



This
BOOK
 on
"Progressive Lubrication"

Containing a Record for Tire and Gasoline Mileage.
 A Valuable help to the Scientific Lubrication of your Car. Mailed to you on Request.

There is MORE POWER in
SUPREME AUTO OIL
 The Ideal Winter Oil. A Perfect Lubricant

We have an attractive proposition for Dealers and Garages.
 Write for particulars, Dept. 1870 Frick Annex
Gulf Refining Company, Pittsburgh, Pa.



Luxurious Light Roadster \$775

BEAUTY

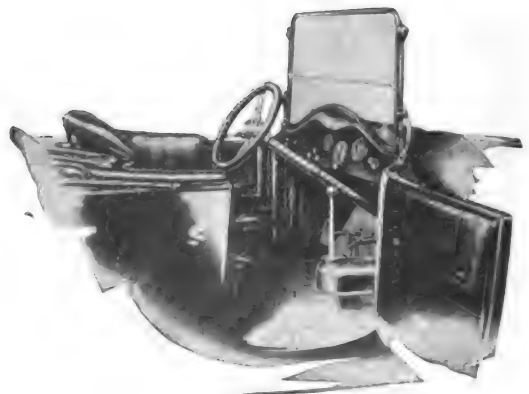
The Shows have proved the new standard of beauty and luxurious equipment of the new SCRIPPS-BOOTH cars.

Only a ride can convince you of their higher standard of comfort and personal motoring enjoyment which is the result of the adoption of the most up-to-date comfort principles.

Light weight is only one feature of these cars, making for easy riding and handling in the rough places.

SCRIPPS-BOOTH luxurious light cars are a new criterion of motor car comfort. Your dealer can convince you.

**SCRIPPS-BOOTH
COMPANY,
DETROIT.**

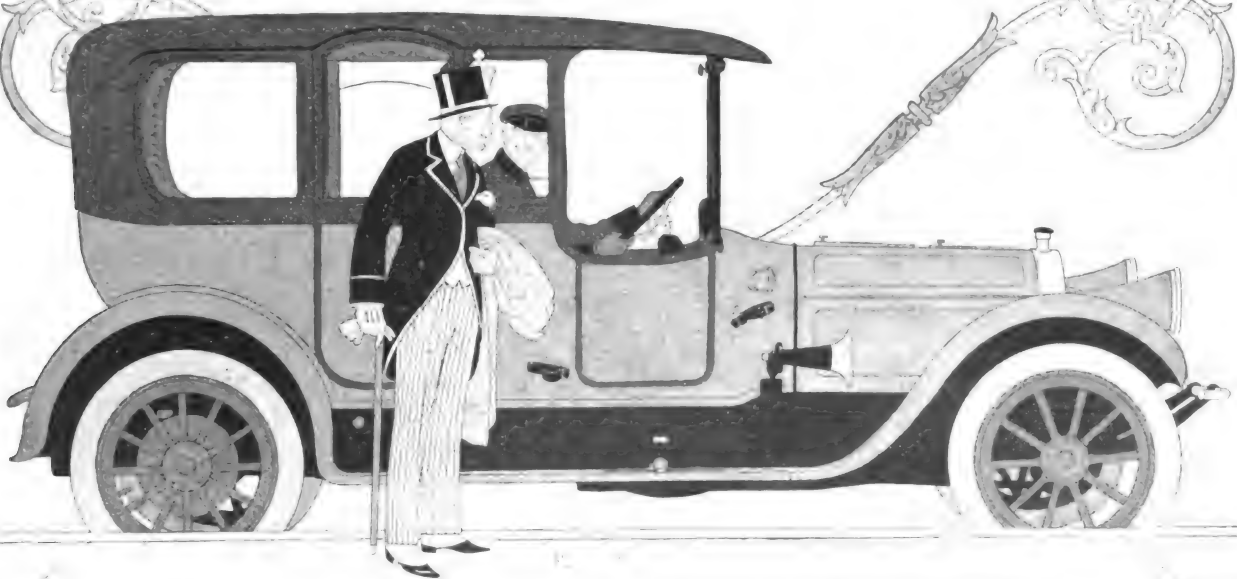


(When Writing to Advertisers, Please Mention The Automobile Journal.)

PIERCE- ARROW

The mind of the owner of a Pierce-Arrow does not run on ahead of him in vain speculation as to whether the car will be on time, or will get him there on time. He soon sinks into a feeling of trustfulness in regard to his Pierce-Arrow. He need never interrupt his plans, break an engagement, allow greater time for going to and fro, or omit doing anything that counts upon the faithful efficiency of a Pierce-Arrow.

THE PIERCE-ARROW MOTOR CAR CO.
BUFFALO NEW YORK



MULTIBESTOS

REG. U.S. PAT. OFF.

PAT. APPL. FOR

Follow the White Foot Prints

The distinct superiority of Multibestos has been proved time and again, both by engineering tests and in the every-day service of thousands of car owners.

That it may be distinct in appearance as well as in quality, we mark it with "White Foot Prints."

Not only do the "White Foot Prints" protect the users of Multibestos, but they also afford a great convenience to the dealers who are handling it—for the marks are spaced exactly and can be used for measurement when cutting from stock to fill orders.

So we say to car owner and dealer alike:

Follow the white foot prints,

They lead to satisfaction in brake lining.

Standard Woven Fabric Company

FACTORY, FRAMINGHAM, MASSACHUSETTS

SALES BRANCHES

Boston—F. Shirley Boyd, 903 Boylston Street

Chicago—F. E. Sparks, 1430 Michigan Boulevard

Philadelphia—N. A. Petry Co., Inc., 1427 Vine Street

San Francisco—Fred Ward & Son, Inc., Corner First and Howard Streets



AUTOMOBILE JOURNAL

\$1.50 the year
10 cents the copy

PAWTUCKET R.I.

March 10, 1915

YOUR SEASON'S PLANS

Choosing the new car—overhauling the old one. The time to decide what you will do about lubrication.

This is the time of the year when your new car is decided upon or the old one overhauled and perhaps fitted with new equipment.

It is the time when the thoughtful motorist will give lubrication renewed attention.

Scientifically-correct lubrication is not a matter of chance. The car that avoids rapid depreciation, noise and high fuel and repair bills is the car whose owner makes up his mind to secure oil scientifically-correct in **body** and **quality** for his motor **and then gets it.**

The 1915 edition of the Vacuum Oil Company's complete Chart of Automobile Recommendations is now leaving the presses. In it is listed the correct grade of Gargoyle Mobiloil for over 600 makes of cars. Send for this chart.

To Dealers: Our 1915 Chart of recommendations appears in national publications this month. New car owners will want the grades of Gargoyle Mobiloil specified for their cars.

Are you ready with a complete stock? Many dealers are placing car-load orders. Our new 15 gallon steel drum with faucet is the most convenient package for private garage trade. Don't overlook it.



Mobiloils

The various grades of Gargoyle Mobiloils, purified to remove free carbon are:

Gargoyle Mobiloil "A"

Gargoyle Mobiloil "B"

Gargoyle Mobiloil "E"

Gargoyle Mobiloil "Arctic"

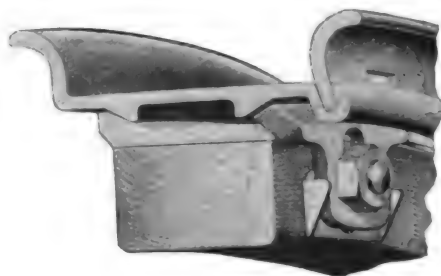
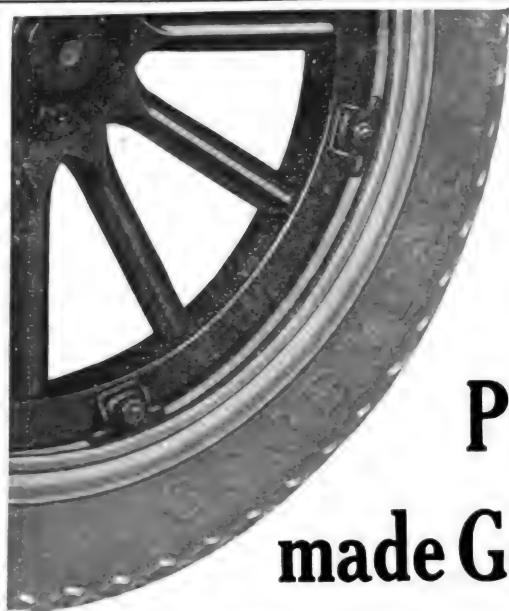
It is safest to buy in original packages from your dealer. Look for the red Gargoyle on the container.

VACUUM OIL COMPANY, Rochester, N. Y., U. S. A.

Specialists in the manufacture of high-grade lubricants for every class of machinery. Obtainable everywhere in the world.

DOMESTIC BRANCHES:

DETROIT BOSTON NEW YORK CHICAGO PHILADELPHIA INDIANAPOLIS MINNEAPOLIS PITTSBURGH
Ford Bldg. 49 Federal St. 61 Broadway Fisher Building 4th & Chestnut Sts. Indiana Pythian Bldg. Plymouth Bldg. Fulton Bldg.



Plain Simplicity made Goodyear Rim-Success

Evolution in Rim Design

Constant study and experimenting produced this better Goodyear Rim.

Tires themselves are annoying if they happen to go wrong. But it's the "grief" in changing tires that causes trouble.

Now it's done without hard work by the Goodyear Detachable Demountable Rim.

Goodyear Rims can't stick—won't balk when you want to take them off. And you don't have to "pound them to pieces" when you try to put them on.

They slip off and on as easy as the telling. Simplicity is the key note of Goodyear Rim-Success.

Take the Drudge Out of Tire Replacing

Tires aren't hard to replace when the rim parts are few and *fit*.

Note these Goodyear points of simplicity—that make easy rim operation.

The detachable side rim makes it possible to remove the tire from the rim without first removing the rim from the wheel. This is impossible with any split type demountable rim.

The Goodyear is a *solid base* rim. It is the lightest demountable rim on the market with the detachable feature. It won't pinch the tube or permit squeaking; it won't allow water and dirt to

penetrate and attack the tube—all common faults of split base rims.

The wide rim base is a very distinctive feature. This gives you extra air space—the effect of a larger tire.

Manufacturers Specify Goodyear

Manufacturers are steadily adopting Goodyear Rims. Price is not a consideration with them where car owner's comfort is at stake. Ease of Goodyear Rim operation has won them for their cars.

Yet the cost to car owners is no more than for rims of lesser worth.

Dealers Make Added Sales

Many car owners are troubled by complicated and poorly designed rims. This means a great deal of change-over rim business.

Push these Goodyear Rims. They save in time, in tires, in trouble. They give best satisfaction. They win you a customer—that means his business in the future. They mean attractive profits.

Write for Facts Today

Dealers—write us for our complete proposition. We help you promote sales in count-

less ways—window displays, free signs, free show cases, free "Tire Saver" booklets.

No obligation. Write us today.

Address Desk 46.

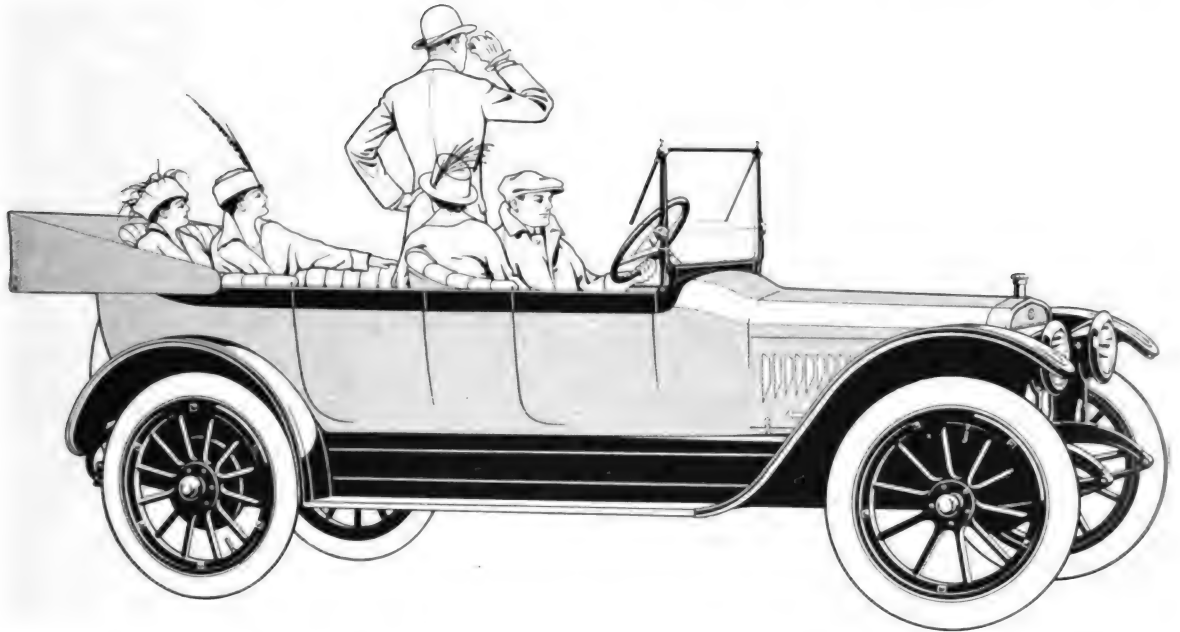
(2190)



THE GOODYEAR TIRE & RUBBER COMPANY, AKRON, OHIO

Makers of Goodyear Automobile Tires.

THIS IS THE CAR



WINTON SIX

**Absolutely the first
genuinely high-grade
car ever marketed
at less than \$3000.**

**Six cylinders, 3⁵/₈ x 5¹/₄.
Wheel base, 128 inches.
American Beauty Body.**

NOW—for absolutely the first time—a genuinely first-class six-cylinder car can be bought for less than \$3000. It is the New-Size Winton Six at \$2285—the car that went into the New York show without a single line of preliminary advertising and won instantaneous admiration. Nothing experimental or freakish, nothing veneered or false, and no striving for effect—but just the nicest automobile creation of the year. And we finish it for you in your own personal colors.

Complete Catalog Now Ready

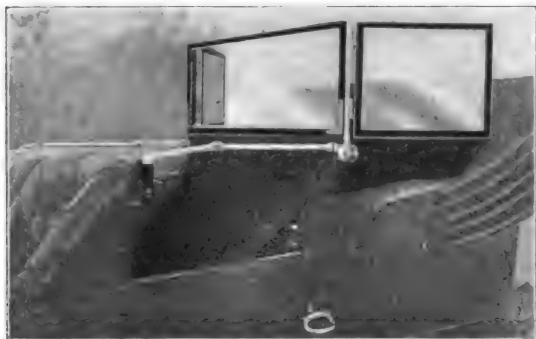
The Winton Motor Car Co., 131 Berea Road, Cleveland, Ohio.

Branch Houses in Leading American Cities

(When Writing to Advertisers, Please Mention The Automobile Journal.)

AUSTER TONNEAU SHIELD

The Ideal Summer and Winter Touring Car Equipment



Shield Extended to Protect Rear Seats

The shield that positively protects the tonneau seats against all wind, dust and back draught.

That makes riding in any tonneau a pleasure.

Can be attached to any car, old or new and is instantly extending, folding and adjustable.

The Auster is the original and patented English tonneau shield, (U. S. Patent) and it is the only satisfactory tonneau shield made. More than 50,000 have been sold in Europe and for all makes and models of cars.

No touring car is completely equipped without the Auster. It is easily and quickly attached. It folds up when not in use, it is never in the way, it can be adjusted by any one to any position and it cannot rattle or break down. It does not interfere with entrance or exit of passengers.

A STRONG DEALERS' PROPOSITION, because the Auster shield is a needed, practical, ornamental attachment, finely made and of the best material. The Auster is sold with a positive guarantee as to workmanship and finish and to thoroughly protect passengers in the rear seats against wind, dust, back draughts, and other motoring inconveniences. It will make any touring car as comfortable and nearly as warm and weather proof as a machine with an enclosed body.

WRITE FOR NEW 1915 TRADE PRICES, jobbers' and dealers' discount sheets. The Auster shield is a wonderful seller and every first-class dealer should learn the details of our attractive proposition. It is a well worth while one and in a big way. The Auster is recognized as a standard finished product, and the only shield that will accord full satisfaction. This is why dealers should learn our general selling promotion plans, our advertising policy and the co-operation extended the trade.

WARNING—The Auster Tonneau Shield is covered by world wide patents. Other tonneau shields are imitations, are not folding or instantly adjustable, and do not have the other features found in the Auster. Infringements will be prosecuted.

The Auster dealer sells with a complete guarantee that every shield must prove satisfactory after 30 days' trial or full amount paid for it will be refunded. Our guarantee is the same to the dealer.

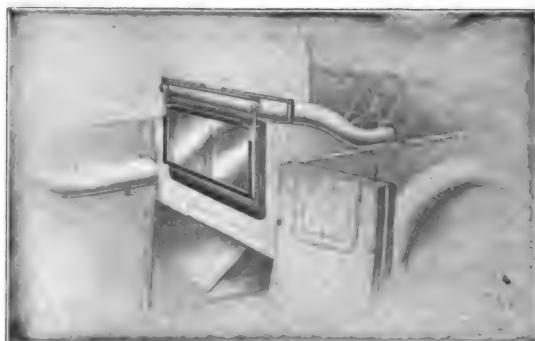
The Resources and Stock of

This Company is the Auster

Dealers' Working Asset.

There is no accessory made that the trade can sell so easily or that will bring more substantial or direct returns. To sell the Auster requires but little energy—but a single demonstration. The dealer needs to make only a minimum investment.

Our guarantee protects dealers and their customers.



Shield Folded Up—When Not wanted.

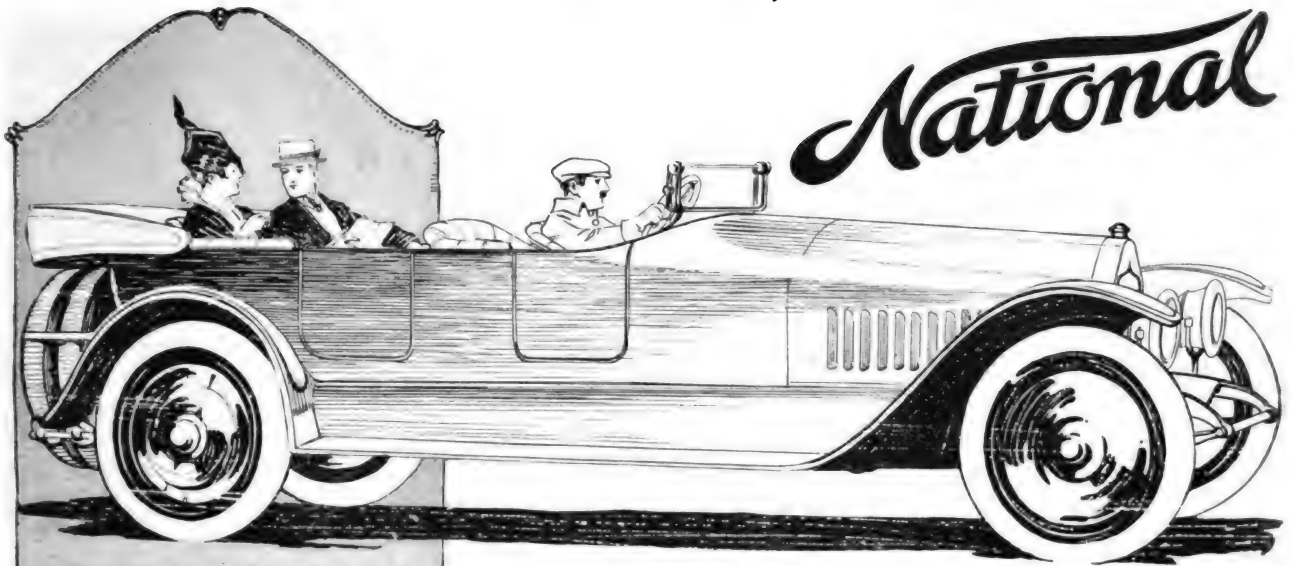
FRYER-AUSTER COMPANY

11 PINE STREET

Sole Owners and Manufacturers

PROVIDENCE, R. I.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



To ride in a National is to
continue home relaxation



RIDING in a swiftly gliding *National* is "drawing room comfort" on wheels. It does not require a changed mental attitude or sacrifice of bodily comfort. The quietly operating machinery makes a pleasure out of the necessity for transportation.

Not a discordant note is evident in the new marine design of the *National* Sixes; convenient seating arrangements; exquisite finish; tonal effects of rich bodies, and finely wrought metal.

The *National* is not a mere collection of "parts"—it is the achievement of fifteen years concentration to excel in this one thing. It adequately meets all service demands, as can only be met by the lineal descendant from the Stock Car Champion and the International 500-mile race record holder for "made in the U. S. A." cars. Its own reputation is its hardest competition. That this new Six is worthy the name *National* is shown by the present increase of 45 per cent in sales.

To appear in the public in a *National* is to never compromise your taste or dignity. This car takes precedence through merit.

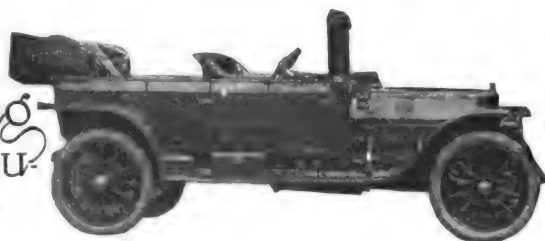
National Six \$2375

Seven distinct new styles—roadster or touring cars with divided front seats and disappearing auxiliary seats. Special bodies up to \$2850 including Coupe, Cabriolet and Parlor Car with individual adjustable arm chairs. *National* Sixes develop any part of 55 h. p. at a fuel efficiency up to 17 miles per gallon.

National Motor Vehicle Company, Indianapolis

(When Writing to Advertisers, Please Mention The Automobile Journal.)

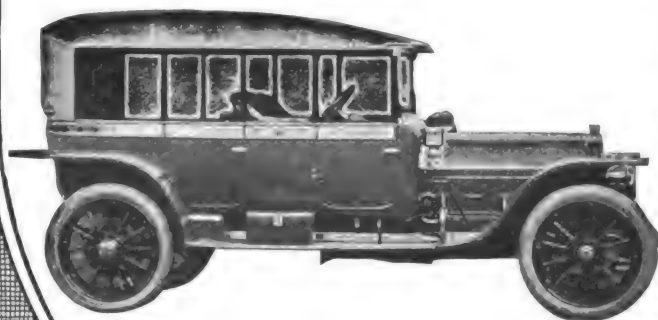
The comfort of every car body combined. An instantaneously convertible equipment that affords a touring body or a limousine whenever desired.



Changes can be made on the road as readily as in the garage. No matter what the occasion or requirement, your car with the

SPRINGFIELD CONVERTIBLE BODY is always ready and always has

the accommodation and protection you desire.



Can be raised or lowered

as easily as folding top.

SPRINGFIELD METAL BODY CO.

SPRINGFIELD

MASS.



BOSCH Magnetos

are made as well as expert workmen with the best of machines and best of raw materials can make. Because of this the Bosch Magneto is known as the most desirable ignition system.

By reason of its quality the Bosch Magneto may cost a trifle more than other ignition systems—but, considering its ability to serve long and well and to give efficient service irrespective of the knowledge or attention of the user, it is comparatively the cheapest ignition system made.

No car is too low priced to satisfy—to satisfy it must be the Bosch-Equipt

Correspondence Invited

BOSCH MAGNETO CO., 240 West 46th Street, New York

Chicago—Detroit

Over 250 Service Stations

San Francisco—Toronto

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Index to Advertisers.

Page	Page
Ahlberg Bearing Co.....76	Studebaker Corp.....76
Alsten & Goulding Co.....71	Stutz Motor Car Co.....15
Barrett Manufacturing Co.....67	Superior Mfg. Co.....71
Bosch Magneto Co.....5	Texas Oil Co., The.....77
Boyd, F. Shirley.....76	Times Square Automobile Co.. 6
Braender Rubber & Tire Co...71	Thermoid Rubber Co.....7
Coes Wrench Co.....12	Tuller Hotel.....78
Continental Asbestos Corp...78	Vacuum Oil Co.....Cover
Culver Stearns Co.....77	Valvoline Oil Co.....76
Dixon Crucible Co., Jos.....76	Vanderpool Company, The... 6
Dover Stamping & Mfg. Co...76	Weed Chain Tire Grip Co...71
Eagle Oil & Supply Co.....6	Willys-Overland Co.....Cover
Elsemann Magneto Co.....72	Winton Motor Car Co.....1
Findelson & Kropf Co.....16	Zenith Carburetor Co.....71
Fryer-Austin Co.....2	
Garford Mfg. Co.....72	
Goodyear Tire & Rubber Co...Cover	
Harris Oil Co., A. W.....75	
Heinze Electric Co.....77	
Hoffecker Speedlock Co.....9	
Hotel Tuller.....78	
Indian Refining Co.....75	
Inter-State Motor Co.....75	
Jeffery Motor Car Co.....11	
Lovell McConnell Co.....80	
Marburg Bros.....76	
Mayo Mfg. Co.....14	
McQuay, Norris Mfg. Co...Cover	
Mea Magneto Co.....76	
Metz Company.....72	
Miller Rubber Co.....13	
Milwaukee Auto Spec. Co...75	
Motor Parts Co.....78	
National Motor Vehicle Co...3	
New Departure Mfg. Co.....8	
Nordyke & Marmon.....71	
N. Y. & N. J. Lubricant Co...75	
Oxygen Generator Co.....70	
Palge Detroit Motor Car Co...76	
Peerless Motor Car Co.....78	
Pyrene Co. of N. E.....79	
Reflex Ignition Co.....74	
Royal Equipment Co.....76	
Sager Co., J. H.....75	
Salvador Motor Co., The...78	
Scripps Booth Co., The.....73	
Smith & Bros., Typewriter Co., L. C.....74	
Splittdorf Electric Co.....77	
Springfield Body Co.....4	
Standard Oil Co.....76	
Staybeston Mfg. Co., The...71	

FOR SALE.

Shop Vulcanizer, Bargain.
Vanderpool, Springfield, O.

We sell everything pertaining to the automobile at half regular prices. Send for our great "PRICE WRECKER" No. 5, containing 3000 auto bargains at cut prices. TIMES SQUARE AUTOMOBILE Co. World's largest dealers. S. W. Cor. 56th St. and Broadway, N. Y. 1210 Michigan Avenue, Chicago.

Accessory and Garage Journal

Only Trade Readers

20,000 Copies

EACH MONTH
GUARANTEED

Unequalled in Its Field

Write for Proof and Rates

IMITATED
BUT NOT
DUPLICATED

N
O
K
A
R
B
O
N

E
A
G
L
E
I
N
E

A
U
T
O
O
I
L

THE OIL THAT SUITS
AND DOES NOT SOOT.

Carbon in your cylinders means loss of power. Customers report 10,000 to 15,000 miles with no carbon troubles. A good motto: TRY ANYTHING ONCE. EAGLEINE NO-KARBON AUTO OIL is furnished in 1-5-10 gallon, 30 and 50 gallon Steel Drums with faucets for which no extra charge is made.

EAGLE OIL
AND SUPPLY CO.

104 BROAD STREET, BOSTON, MASS.

WESTERN UNION
DAY LETTER

GEORGE W. E. ATKINS, VICE-PRESIDENT
NEWCOMB CARLTON, PRESIDENT
SELVIDERE BROOKS, VICE-PRESIDENT

RECEIVED AT
A122CHO38BLUE SAN FRANCISCO CALIF MAR 8 1915
THERMOID RUBBER CO TRENTON N J

I JUST WON THE VANDERBILT CUP RACE USING THE SAME NASSAU TIRES
IDENTICALLY AS I USED IN GRAND PRIX THIS IS TRULY WONDERFUL
NASSAU TIRES ARE REALLY REMARKABLE AND I AM PROUD TO SHARE THE
HONORS WITH THEM

D RESTA

700 MILES—TWO VICTORIES—On The Same Set of Nassau Tires All-Mighty Tough

First in the Grand Prix—first in the Vanderbilt Cup—700 miles without a tire change! This double victory of Resta on **one** set of NASSAU Tires hangs up a record unique in the history of motoring.

It is noteworthy that the four most important road racing trophies in this country—the Vanderbilt, Grand Prix, Elgin National and Chicago Automobile Club Cup—are held by two men—Resta and De Palma—both of whom have won these trophies on Nassau tires, **exclusively**.

The NASSAU Tires Resta used were **stock** tires—the same kind **you** can obtain from any NASSAU dealer. Make up your mind to try NASSAU next time.

THERMOID RUBBER COMPANY

Factories and Main Offices, Trenton, N. J.

Dealers Everywhere



(When Writing to Advertisers, Please Mention The Automobile Journal.)

NEW DEPARTURE BALL BEARINGS

American Made for American Trade



Scientifically developed for the sole purpose of meeting the quantity requirements of motor car builders and users, for an American made ball bearing of practical utility and of quality that cannot be surpassed.

**There are four types of
New Departure Ball Bearings**

DOUBLE ROW:

A dual capacity bearing, takes end thrust and radial loads in combination. Will replace one radial and two thrust bearings in any mechanism.

RADAX:

And angular contact single row bearing, designed to carry radial load in combination with one direction thrust.

: SINGLE ROW

Designed as the final standard of this type of bearing for radial load only, reducing friction losses to the minimum.

: MAGNETO

Designed to carry slight end thrusts as well as radial loads. A superior bearing for light loads at high speeds.

The New Departure Mfg. Co.

Bristol, Conn., U. S. A.

**Distributors
in Trade Centers Throughout
the United States**

**Western Branch
1016-17 Ford Building
Detroit, Michigan**

SEND FOR OUR CATALOG

(When Writing to Advertisers, Please Mention The Automobile Journal.)

A SAFETY DEVICE

**PROTECT YOUR CAR
AGAINST**

THEFT

By Locking Gauge at the Lowest Point Car Cannot Be Driven.

FINES

The Speedlock set at the legal speed per hour is conclusive evidence for release in any case of unjust arrest.



**PROTECT YOUR FAM-
ILY AGAINST**

SPEEDING

Set Gauge at Speed Above Which You Would Feel Restless to Have Any of Your Family Driven.

ABUSE

Car Can Be Locked at Low Speed When in Strange Hands.

THE HOFFECKER SPEEDLOCK

"Locks the speed, not the motor."

This Attachment to the Hoffeecker Speedometer Is Controlled by the Speedometer Governor and Has the Same Action on the Throttle as a Driver—Automatically Releasing the Throttle When Slower Speed Is Desired and Securing Throttle to Entirely Inactive Position When Car Is to Be Left Alone—

FOR TRUCKS: *Precludes heavy maintenance costs as it allows truck to be driven only at normal speeds.*

COSTS LESS THAN ONE FINE

WRITE FOR CATALOGUE

THE HOFFECKER COMPANY

MOTOR MART BUILDING

BOSTON, MASS.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

PUBLISHER'S AND READER'S PAGE.

THE extremely large volume of business transacted at the Boston automobile show is an evidence that there is a constantly increasing confidence both industrially and commercially, and that the country has practically adjusted itself to the conditions resultant from the European conflict. Keen interest in the wagons and trucks and unexpected purchasing indicates that the demand for machines, evidently impelled by need of economies, will be greater than ever before.

The expressions of exhibitors at the show, as reflected by The Automobile Journal, demonstrate conclusively that the Boston exposition of 1915 was the largest ever organized in that city and decidedly the most productive. Besides the actual sales the character and number of prospects justifies the belief that the spring buying will be greatly in excess of previous years.

The double victory won by Resta at the Panama-Pacific Exposition, in which he defeated large fields of entrants for the Grand Prize and Vanderbilt Cups, has very much stimulated interest in racing in America, and there is reason to believe that the contests in the season to come will be numerous and competed for by men of undoubted ability on the road and track.

Owners who drive are the great majority of motorists, and hundreds of thousands, often from choice and frequently from necessity, maintain and repair their machines. For the information of this class a series of articles on "Practical Motor Car Repairs" has been begun in this issue, and this will continue as long as is believed desirable. The subjects are diversified and each description is sufficiently detailed so that a work can be undertaken with cer-

tainly of good results. Each repair is well illustrated, so that any man with even limited mechanical knowledge will understand the principle and its application. Special tools are seldom necessary, although an owner may be compelled to have some work done outside because of the absence of facilities. This series of articles should be preserved by every owner or driver, because of the real value of the information.

The small car is rapidly increasing in numbers. Thousands of motorists who utilize their vehicles for business purposes, understand the advantage of the light weight machine, which can be operated economically, and which will afford extremely satisfactory service. The articles that deal with the light cars in The Automobile Journal will be of special interest and will have definite value to all readers.

The value of any publication to the reader is the use made of the information that is found in its pages, and the more thorough the reading the better the results. Readers of The Automobile Journal will find in its editorial pages facts that can be applied to purchasing, and which can be made to realize decided saving.

Every phase of motor vehicle design, construction, care, repair and maintenance, is dealt with in the series of automobile mechanical handbooks published by The Automobile Journal Publishing Company and these will be found invaluable by the owner or driver. These books are used by hundreds of schools and colleges as text books, not only because they are practical, but from the fact that they have been prepared to meet requirements of the man who wants knowledge without technical verbiage. Literature and details will be sent to inquirers.

Partial Table of Contents.

	Page
*The Boston Automobile Show.....	17
*Resta Wins Two Classics.....	21
*Mechanical Features of 1915 Cars.....	24
*1000-Mile Race for \$100,000.....	26
*Boston Exhibitors Report Big Sales....	27
Preparing for Greatest Touring Season..	32
*General News of the Industry.....	33
*New Closed Bodies for Chandler Cars...37	
Terms of the New Rubber Agreement..	39
*Cole Predicts Big Touring Year.....	40
*Bridgeport Show a Pronounced Success	42
*Dort Announces Two New Models.....	43
*Oil Production Breaks All Records.....	44
*Lewis VI Has Many New Features.....	47
Editorials	50
*Evidence on Beginning of Auto Industry	51
*In the Commercial Car Field.....	53
*Practical Motor Car Repairs.....	59
*News of the Manufacturer.....	64

*Indicates article is illustrated.

SUBSCRIPTION BLANK.

Date _____

AUTOMOBILE JOURNAL PUBLISHING CO.,

TIMES BUILDING, PAWTUCKET, R. I.

Enter Order for the Following Publications:

(Designate by marking X in Space at Left of Titles)

—The Automobile Journal (Subscription, one year).....	@ \$1.50
—The Motor Truck (Subscription, one year).....	@ \$2.00
—The Accessory and Garage Journal (Subscription, one year)....	@ \$2.00

Enter Price for Each Book Ordered

Make Remittances by Check, Bank Draft, Postoffice or Express Money Order or Stamps. All Money Enclosures Are at SENDER'S RISK.

Name _____ Street _____

City or Town _____ County _____ State _____



A Man of Good Sound Judgment—

said the reason he bought a Jeffery was because it best satisfied his idea of what a motor car should be in five leading features.

Quality—In every detail of construction where a few dollars determined the difference between the average and the best, Jeffery used the best—he mentioned the Chesterfield Worm Drive; Bijur starting and lighting; Four Speed Transmission; Quality Built Motor and Bosch Ignition as examples.

Beauty—Looking at the Jeffery from any point of view the distinctive beauty of body lines gives it an appearance of high tone—an atmosphere of refinement that makes it dominant by comparison with others.

Comfort—A ride in a Jeffery is unlike a ride in any other motor car. Lancaster spring suspension on the Chesterfield Six, deep cushions scientifically designed and double seat springs smooth out the roughest roads.

Economy—An authentic record, made by a stock car, of 28.6 miles per gallon of gasoline only bears out Jeffery low fuel consumption in every day service.

Stability—The Jeffery organization has always built a car that included only the best in materials, workmanship and design, and Jeffery has always been sold on this basis. Jeffery cars have a higher value, three, four or five years after they are sold, than any other.

Chesterfield Six, \$1,650

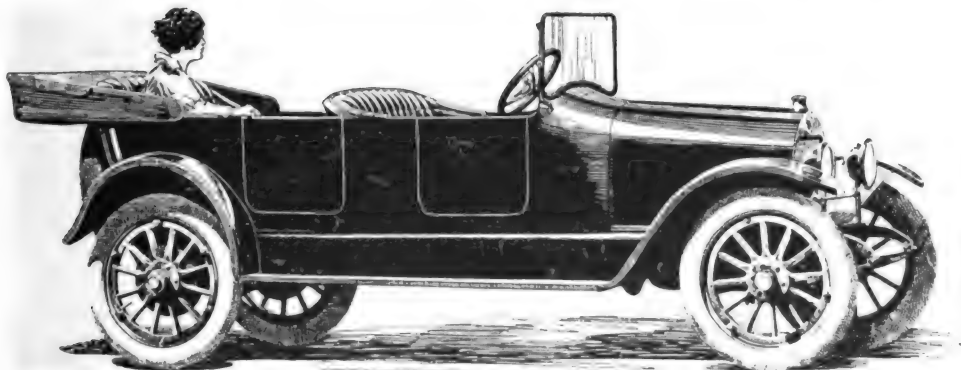
Jeffery Six-48, \$2,400

Light Four, \$1,450

The Thomas B. Jeffery Company

MAIN OFFICE AND WORKS,

KENOSHA, WISCONSIN



(When Writing to Advertisers, Please Mention The Automobile Journal.)



Wrenches Are Made Right, Stay Right,
Last a Lifetime, and are 30% Stronger
Than Any Other.

"COES" on any Wrench Means Quality,
Best Material and Finest Workmanship.
An Inspected and Tested Wrench. The
Ironclad "COES" Guarantee for Strength
and Finish.

The "COES" Automobile Model are for Motorists
and Repairmen. For Service Specify "COES" No
Tool Kit or Repairshop is Complete Without One.

Ease of Handling Without Fear of Slipping or Bruis-
ing. Perfect Balance and Certain Grip has made the
"COES" the Most Widely Used Tool of the Kind in
the World.

COES WRENCH CO.

WORCESTER MASS.

J.C. McCARTY & CO.
JOHN H. GRAHAM & CO.

29 Murray St. New York City
113 Chambers St. New York City

When Writing to Advertisers, Please Mention The Automobile Journal.

What's the Answer to the Skid Question?



But to Protect You They Must Be On Your Car!

WHEN your car's geared-to-the-road you can put "skid fear" behind you forever. To drive with confidence and comfort—to have your car instantly obey your slightest touch at the steering wheel—to secure absolute traction on slippery city streets or on treacherous country roads, you must have a tire that is built to meet those conditions.

Miller "Geared-to-the-Road" Tires are scientifically built to gear your car to the road through mud, sand or slush. With Miller tires on your car you're in control. Its tread is an integral part of the tire and retains its safety features until the entire tire is worn out. The greater mileage you get from them will make your choice of

Miller GEARED TO THE ROAD Tires

An economy, as well as a permanent safeguard.

But Miller Safety Does Not Stop There

Miller mileage and safety on the road are due to exclusive methods of tire building in the Miller factories.

The "Miller Method" retains the natural vegetable wax and oil in the cotton fibre during the process of vulcanization. And this natural lubricant in the cotton means less internal friction and more life and miles in your tires.

Wax and oil carbonize at 240 degrees; the old method

requires about 287 degrees to vulcanize a tire. The Miller Method vulcanizes at a low degree of heat without robbing the fabric of its life-giving wax and oil, and thus saves the fibre from becoming brittle and losing its tensile strength. Your Miller tire has not been "burned out" during manufacture—all its wear, toughness, endurance and all its mileage are preserved for wear on your car.

There are responsible Miller dealers everywhere—write us if you can't locate yours.

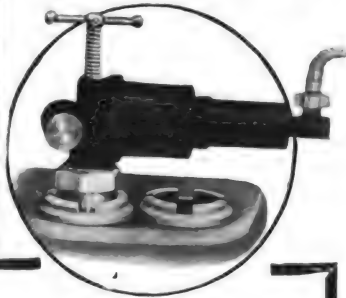
The Miller Rubber Co., Akron, U. S. A.
Distributors in the Principal Cities

You expect the tread to be strong and secure. But do you know that the tread is at the mercy of the fabric inside the tire? You can't judge a tire merely by its exterior appearance. It is the life in the fabric that makes the MILLER Geared-to-the-road tread doubly effective. MILLER TUBES answer the tube question

The GEARED TO THE ROAD Tread

(When Writing to Advertisers, Please Mention The Automobile Journal.)

**Try One Free
On Your Car
For 30 Days**



If you want the very latest in a permanently attached tire pump, always ready for instant service—install a reliable

MAYO VALVE CAP PUMP

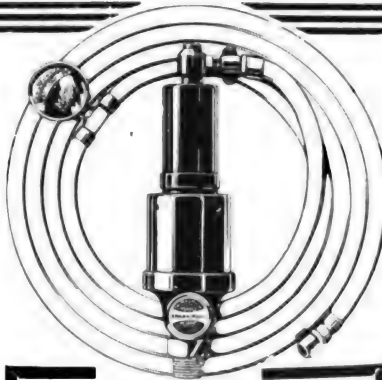
To operate: Without stopping the motor, simply press down the handle, give it a quarter turn and the pump starts working.

Readily installed into one of the valve caps on any 4-cycle motor.

All the unequalled advantages of the MAYO Spark Plug PUMP principle plus the permanent attachment feature. No gears to grind and become noisy. Pumps a tire in 3 minutes instead of 10. Complete with 14 ft. hose, gauge and all connections—

\$15

None of the disadvantages of gear pump installation and upkeep expense.



If you are touring to the coast this summer or are only driving to the next town—or about the boulevards—you need a

MAYO SPARK PLUG PUMP

—to take care of tire emergencies.

A flat tire, with a MAYO to do the pumping, is but a pleasant incident in the drive. Without a MAYO, it is a back-breaking, pleasure-spoiling job, that means pumping 80 lbs. pressure by hand.

The MAYO Spark Plug Pump is the oldest and best known power pump on the market. Pumps pure, fresh air only. Adapted to any car. Instantly substituted for any spark plug. Built with rings like your motor—and lasts as long. Complete, 12 ft. hose, gauge and all connections—

\$10

The MAYO is the lowest priced quality tire pump. Investigate.

**The Pioneer of all
Power Pumps
—World Famous**



Whether you are using your Ford for transcontinental touring this year—or simply touring about home—complete your equipment with a

MAYO FORD PUMP

It takes all the work out of tire pumping.

It gives your Ford the greatest convenience of highest priced cars, and it is a tire economy you can't afford to overlook.

The MAYO Ford Pump is made especially for Ford cars, and as perfectly as the largest MAYO. Attached and operated exactly like standard MAYO Spark Plug Pump.

Complete with 10 ft. hose, gauge and all connections—

\$8

The first quality Pump at a price consistent with Ford cost.

**You Will Need a
MAYO Pump on
that Tour to the
Coast this Summer**



Mayo Mfg. Co.

64 East 18th Street
Chicago Illinois

**Write Us for Full
Information**

When Writing to Advertisers, Please Mention The Automobile Journal.

STUTZ



Stutz Four Cylinder Bulldog

RACING Records demonstrate the quality of design and construction, but STUTZ Cars are raced to prove quality.

Second and fifth places in a field of 30 starters, both foreign and American cars, were won by STUTZ Cars in the 1915 Grand Prize Race.

The second place in the 1915 Vanderbilt Cup race was won by a STUTZ, the first American car to finish.

STUTZ Racing Quality means the service qualities are proven, that the STUTZ is the

American Motorist's Ideal Car for Any Service

FOUR-CYLINDER

H. C. S. Roadster	\$1475
Beacant	2000
Roadster	2000
Bulldog	2250
Touring	2275
Sedan	3075

SIX-CYLINDER

Beacant	\$2125
Roadster	2125
Touring	2400
Sedan	3800

There Are STUTZ Agencies in All Principal Cities

STUTZ MOTOR CAR COMPANY, Indianapolis, Ind.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

RAYFIELD

CARBURETORS

Rayfield Equipment Makes Quality Cars

Do you know that when a manufacturer puts a Rayfield on his car it means that the Rayfield is especially fitted to the motor, after thorough tests?

It means that that car has the most perfect carburetion human skill can provide.

It means that the owner is assured of *unequalled* economy, acceleration, speed, power and low throttling.

And it means also that the manufacturer preferred to pay the higher price for the Rayfield, rather than permit his car to be equipped with a less efficient carburetor because it could be bought for less money.

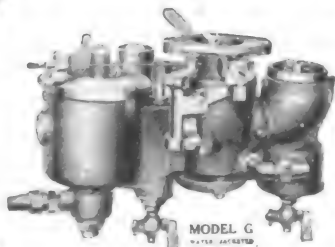
Models for all cars

You can get one for your car, from your dealer or direct from us. Rayfield service stations are established in all leading cities and towns

FINDEISEN & KROPF MANUFACTURING CO.

2127 Rockwell Street, Chicago, Illinois.

Branches: 1140 Michigan Avenue, Chicago
1214 Woodward Ave., Detroit 1902 Broadway, New York



(When Writing to Advertisers, Please Mention The Automobile Journal.)

The AUTOMOBILE JOURNAL



The BOSTON AUTOMOBILE SHOW

THE 13th annual Boston automobile show, which is being held at Mechanics hall, Boston, Mass., having begun March 6 and is to close Saturday evening, March 13, maintains its international prestige as the greatest in the world. Exhibitors who have participated in all the shows of this and past seasons, almost invariably declared it to be "the greatest show of the season".

Careful estimates formed after canvassing the exhibitors and visitors permit the declaration that this show will break all previous records in point of attendance, sales and genuine interest manifested in the exhibits of pleasure cars, trucks and accessories. More than 50,000 people from all parts of the country entered the hall daily, it is said, which will bring the total for the week

up to the unprecedented number of 350,000 visitors, not including employees, exhibitors, etc. A notable feature of the attendance is that a great proportion of the visitors come from all parts of New England in their automobiles, while the trains and surface cars are thronged day and night.

Unlike the Boston show of previous years, the weather conditions were perfect the first half of the week, with all promise for continuation during the whole show. This fact probably greatly influences the record attendance. The skies were clear, the temperature was moderate for the season of the year and the net work of roads leading to the Hub are in excellent condition for automobile travelling.

The success or failure of an automobile show

from the viewpoint of an exhibitor is of course largely determined by the sales. The 13th annual Boston exhibition is exceeding all others in that

13th annual Boston automobile show will be recognized as the greatest ever held in any American city. Coming at the end of the exhibition season, as it does, it forms a brilliant climax to a season that has been notable for its record breaking shows. It will increase the enthusiasm and optimism of the dealer and manufacturer who now are on the threshold of the active spring selling period, and presages a prosperous year for the automobile industry.



Aisle in Accessories Displays, Department F, Where Crowds Lingered.

respect. It has been estimated that the aggregate sales will reach the sum of \$3,000,000, sales of pleasure cars and accessories amounting to \$2,000,000, while commercial trucks will establish a record at \$1,000,000. Heretofore the Boston show has been noted for its retail sales, as the New York show has been notable for sales to dealers. However, this year the Boston exhibition is astonishing everyone by the great increase of sales to dealers, and the establishment of agencies. Several manufacturers have closed with dealers for their entire New England territories.

From the viewpoint of the visitor, the show is a great success because of the great diversity of exhibits of pleasure cars, commercial trucks and accessories. In all there are 105 exhibitors of cars and trucks, 71 being pleasure cars and 34 commercial trucks, fire engines, ambulances, patrol wagons, etc. In the accessories departments there are more than 230 exhibitors, displaying an almost inexhaustible variety of new accessories, many of which are seen for the first time at this show.

All things considered, the

ment of lines the White Company shows the double cowl, while the Scripps-Booth car reflects the luxurious appearance of high priced cars in a low-priced machine. In new seating features the Briscoe car has an egg-shaped tonneau for three passengers, two sitting abreast and the third in the rear. The National Parlor car is equipped with four parlor car chairs, which revolve on swivel bases and are luxuriously upholstered. The new feature in Hudson cars is that the extra tire is carried ahead of the fore door. Overland cars have the control all located on the steering post. On the Pierce-Ar-



Commercial Truck Division, Department C, Showing Trimmings of Foliage.

row cars is exhibited the semi-indirect lighting system. The Franklin air-cooled, the only one of the type on exhibition, is attracting great interest, as is the Stanley steamer, also the only one of its kind at the show.

The interest shown in the truck departments presages a rapidly increasing development of this branch of the automobile industry. Unlike former years, the interest in the truck divisions approaches, if it does not equal, that manifested in pleasure cars. Here are shown the newest de-

spark plugs, carburetors and ball-bearing grinders to low-priced bodies for Ford cars, complete priming systems attachable to almost any car, auxiliary starting systems, and new types of wheels and tires. These departments are thronged from early morning to late evening, and the exhibitors are making record cash sales and prospects.

The stage setting of the Boston show has always been one of the main attractions. This year Ernest W. Campbell, the architect and de-



Stage End of Grand Hall, Showing Grecian Treatment of Decorations with Temple in Centre—At Left of the Stage in the Packard Armored Car.

velopments in White, Packard, Studebaker, Jeffery, Federal, Garford, Mais, Locomobile, Republic, KisselKar, Robinson Fire, Knox, Kelly Springfield, Rowe, Reo, Pierce-Arrow and many other trucks and motor apparatus. One of the features is increased use of the worm driving system for trucks, though the chain drive is still preferred by the majority of builders.

In the accessories divisions there is a host of new features ranging from shock absorbers,

signer, and his corps of assistants, have constructed a vision of beauty, the decorations and architectural designs being in general Grecian effects. As the visitor passes the ticket taker at the entrance to Mechanics' hall he steps into what is usually known as the Exhibition hall, but now converted into a huge Grecian grove, out of which spring numerous great white marbleized columns. It looks like a forest glade in spring time, 100 trees having been transplanted

bodily; their branches, covered with blossoming oleanders, arch over aisles and cross beams. Azaelas droop around fluted columns. Exhibition booths are separated by green hedges and budding plants, the names of exhibitors being displayed on frosted ball globes or frosted glass signs atop of white marble decorated pillars. In this setting are scores of pleasure cars, while throughout the hall in afternoon and evening float harmonious strains from the Laura L. Archambault Woman's orchestra, located in the balcony above.

Passing into the adjoining Grand hall, the visitor believes he has stepped into a Grecian court. Before him on the floor and on the stage are more pleasure cars. Above his head is a re-

for the Boston Philharmonic orchestra, which renders concerts afternoon and evening. The whole hall is encircled by bas relief reproductions of the celebrated Frieze of the Parthenon.

Never before has such care been given to decorating the basement. Usually difficult to secure a harmonious blend of color scheme and architectural design because of constructional conditions, this year the designer has secured a beautiful effect in mural paintings and decorated pillars. Here are located the trucks and like vehicles, together with several exhibits of accessories.

The balconies are almost wholly devoted to the exhibition of accessories, surrounded by decorations conforming to the general scheme throughout the entire exposition.

At night the lighting system, consisting of many gorgeously colored schemes and groups, cast a glow throughout Mechanics' hall that rivals some court functions. This effect is increased by the costumes of the lady visitors, especially on Society Day (Wednesday).

A feature of the attendance that is frequently commented upon by men who have followed the shows for years, is that a great number of visitors are usually lined up before the entrance long before the doors are thrown open to the public. Another comment, voiced by several exhibitors, is that the visitors at this show are evidently there for serious purpose, and that the majority of



White Company's Display of Cars—In Background, Corner of Stage with Cadillac Cars.

production of a deep blue Mediterranean sky in which hundreds of stars are twinkling. At the right, on the stage, which is approached through marble walls and statuary, is the facade of a Grecian temple, through which is seen a glimpse of Grecian scenery, painted on a back curtain 100 feet long and 30 feet high. This forms the background for Cadillac and Packard cars. In the centre of the hall stands a Grecian temple, 25 feet high, with a gilded dome to which numerous lines of lights converge from the ceiling.

At the hall end opposite to the stage appears what is said to be the most beautiful example of large scale scenery in America, a mural reproduction of the Acropolis. This forms a background

people ask questions which indicate a great popular increase in technical understanding of automobile construction, operation and maintenance. They seem fully to appreciate the fact that while the manufacturer is adding refinement and equipment to cars, he also is frequently reducing the price to a level that appeals to all classes. All the exhibits of light cars receive great attention from visitors, which indicates that this type of automobile is meeting with popular approval.

Exhibitors of electric cars state that greater interest is evinced in these machines this year than heretofore, adding that they believe the owners of heavy gas cars are considering seriously the advisability of adopting the electrics.

RESTA WINS TWO CLASSICS.

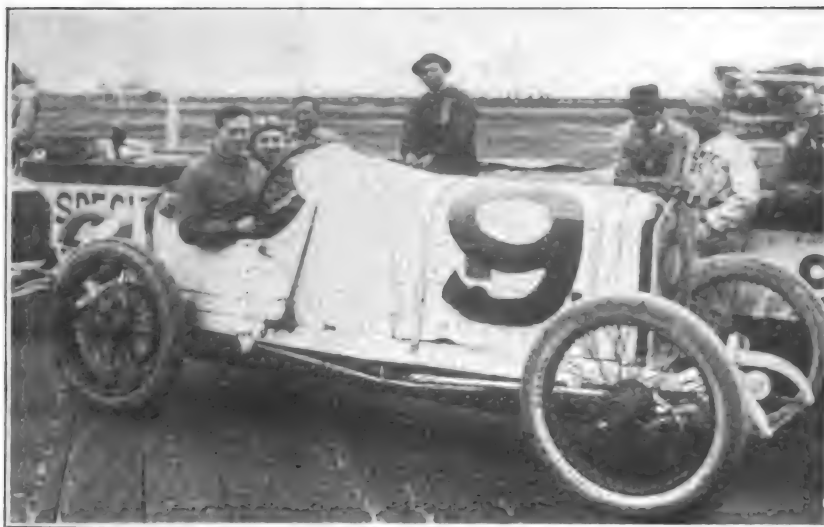
DARIO RESTA, English born of Italian parentage, piloting a Peugeot car of French manufacture, won the two chief events of the

1915 automobile racing season. The second, the Vanderbilt Cup, March 6, was under sunny skies along an ideal course.

Competing against a field of entrants that included some of America's and Europe's most notable automobile racing drivers, he established what can be considered as records in view of the condition of the course and its lay out. In the Grand Prize contest he completed the 402¼ miles of slippery, treacherous track in 7:07:57, averaging 57½ miles an hour. In the Vanderbilt Cup, a distance of 300.3 miles, he led the 32 entrants over the course in 4:27:37, making an hourly average of 67.3 miles.

The races were the sensation of the early days of the Panama-Pacific Exposition, San Francisco, through the grounds of which the course was laid. It was estimated that 68,000 persons witnessed the first event, though a cold, raw wind was blowing and rain was falling. At the second race it was said that more than 100,000 people lined the course.

At no time during either race was Resta able



Dario Resta Piloting the Peugeot in Which He Captured the Grand Prize and Vanderbilt Cup at the Panama Pacific Exposition.

1915 automobile racing season. Grand Prize of the Automobile Club of America and the Vanderbilt Cup. He proved that he is master of his car and the elements, for the first race, having once been postponed on account of rain, was run Feb. 27, in a drizzle that turned the course into a quag-

mire. The second, the Vanderbilt Cup, March 6, was under sunny skies along an ideal course.



Start of the Grand Prize, with Starter Fred Wagner Holding the Watch—Newhouse in a Delage (No. 15), Ruckstall in a Mercer (No. 6) and Earl Cooper in a Stutz (No. 8) Are the Runners-Up.

to relax his gruelling pace, for close behind in both events came the powerful Stutz, driven by Howard ("Howdy") Wilcox, who won second

Kelvy's Overland and Gordon's Gordon Special.

For his victories Resta won the grand prize of \$3000 in the first event, and a similar cash prize for the second, in addition to the famous Vanderbilt Cup, said to be valued at \$5000. Among the four others to finish the race, Wilcox, Hughes, Disbrow and Anderson, \$4000 was divided. In the Vanderbilt Cup, Wilcox won \$2000, Pullen, who finished third, \$1500, De Palma, fourth, \$1000, and Carlson, fifth, \$500.

In addition to these capital prizes there were special prizes offered by manufacturers of automobile specialties and parts. The total offer of the Bosch Magneto Company, New

York City, reached \$1900 for both races. The distribution was arranged as follows: \$500 to winner of Grand Prize; \$150 to the car finishing sec-



Howard ("Howdy") Wilcox in the Stutz with Which He Won Second Place in Both Events—He Crowded Resta All the Way.

place in both races. In the Grand Prize race the cars were sent on their long journeys in sets of three, as follows:

GRAND PRIZE WINNERS.

Driver and Car.	Time H. M. S.
1—Resta, Peugeot.....	7:07.57
2—Wilcox, Stutz.....	7:14.36
3—Hughes, Ono.....	7:21.46
4—Disbrow, Simplex.....	7:31.38
5—Anderson, Stutz.....	7:34.51

Only five finished the race.

VANDERBILT CUP WINNERS.

Driver and Car.	Time H. M. S.
1—Resta, Peugeot.....	4:27.37
2—Wilcox, Stutz.....	4:34.36
3—Pullen, Mercer.....	4:35.37
4—De Palma, Mercedes.....	4:39.07
5—Carlson, Maxwell.....	4:44.12

Oldfield's Maxwell, Gable's Tahis and Alley's Duesenberg.

Ruckstall's Mercer. Anderson's Stutz and Pullen's Mercer.

Resta's Peugeot, Cooper's Stutz. Gandy's Edward Special.

Disbrow's Simplex, Nikren's Mercer. Kennedy's Edward Special.

Newhouse's Delage, Klien's King and Bragg's Californian.

Rickenbacher's Maxwell, O'Donnell's Duesenberg, Le Cain's Chevrolet.

Hearne's Case, Durant's Chevrolet. De Palma's Mercedes.

Wilcox's Stutz, Marquis' Bugatti. Parsons' Parsons' Special.

Taylor's Alco, Hughes' Ono and Grant's Case.

Carlson's Maxwell. Mc-

ond, and \$100 to the third. In the Vanderbilt Cup, \$300 to the first, \$150 to the second and \$100 to the third. A provision of the offer was that to win the money the car must be equipped with



Resta Taking the Right Angle Turn on the Avenue of Progress During the Grand Prize Race.

a Bosch magneto for ignition purposes during the races. In case the ignition equipment used was Bosch throughout, an additional prize of

and Rudge wheels. Disbrow's Simplex, which came in fourth in the Grand Prize race, used Rayfield carburetor, Bosch magneto and plugs, Silvertown tires and Rudge wheels. Fourth in the Vanderbilt Cup was De Palma, in a Mercedes, equipped with the Rayfield carburetor, Bosch magneto and plugs, Nassau tires and Rudge wheels. Anderson's Stutz, fifth in the Grand Prize, used a Rayfield carburetor, Bosch magneto and plugs, Silvertown tires and Houk wheels.



Disbrow, in a Simplex, Leading Barney Oldfield, in a Maxwell, Around the Right Angle—Disbrow Was Fourth in the Grand Prize.

\$100 was offered if the car finished first, second or third.

The Weed Chain Tire Grip Company, Bridgeport, Conn., offered as many silver dollars as could be crowded into a Weed bag, approximately \$250, to the one who set the fastest pace in the Vanderbilt Cup. Franklin H. Wheeler, president of Wheeler & Schebler, offered \$1000 to be divided equally among the cars finishing first in both events, providing a Schebler carburetor was used.

Resta's Peugeot, winner of both races, was equipped with the Master carburetor, Bosch magneto, foreign made plugs, Nassau tires and Rudge wheels. Wilcox's Stutz, which finished second in both events, had a Schebler carburetor, Bosch magneto and plugs, Silvertown tires and Houk wheels. Hughes' Ono, which consisted of a Pope-Hartford body on a Fiat chassis, and finished third in the Grand Prize, was fitted with a Master carburetor, Bosch magneto and plugs, Firestone tires and wood wheels, while the third car in the Vanderbilt Cup, Pullen's Mercer, had a Rayfield carburetor, Bosch magneto and plugs, Silvertown tires

using plugs of foreign manufacture and the Gordon the Rajah plugs. Seventeen cars used Master carburetors; eight, Rayfields; three, Scheblers; two, Harrouns. Silvertown tires were used on 12 cars, the two Mercers also using Palmer make. Six cars used Nassau tires; five, Firestone; two, Riversides; one each using Fisk, Michelin, Hercules, Hardman and Hendries makes. Houk wheels predominated, 13 cars being so equipped; 12 used Rudges.

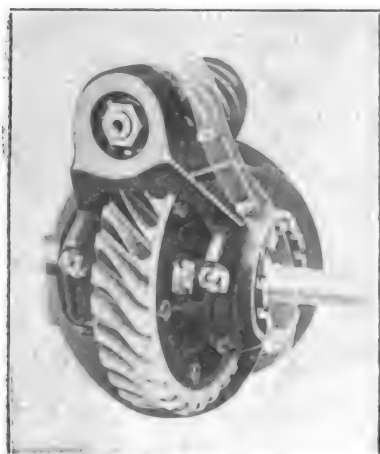


Cooper Crowding Ruckstall While Taking the Right Angle Turn from Avenue of Palma into Avenue of Progress.

MECHANICAL FEATURES OF 1915 CARS.

**Eight-Cylinder and Light Six Types Attracted Much Attention at Boston Show—
Some of the Characteristics Noticeable in Recent Construction.**

MECHANICALLY the Boston show was extremely interesting because of the showing of eight-cylinder pleasure cars and many new types of trucks.



Jeffery Worm-Driven Rear Axle.

Many progressions were noticeable in practically all the machines; not what might be regarded as radical, nor even innovations, but undoubted tendency of the designers to improve existing types.

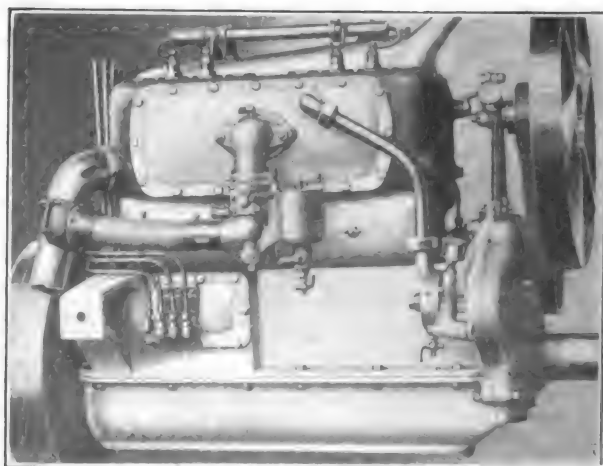
None of the eight-cylinder cars were new in the sense that they had not been previously exhibited, for they were displayed at Chicago, but they were seen for the first time in New England. The exhibits of this class were the Abbott, Cadillac, Cole, Detroit, King and Regal. There are two other eights built, the Remington and the Ross, which were not shown.

There was included in the exposition a very large number of six-cylinder pleasure cars, these

est manifested in these as in the eights, for this is the first season that machines so well known and tested by service have been priced so low.

The number of light sixes was surprisingly large, for there is evidently a belief by the manufacturers that this class will become extremely popular, and there has been less attention given to the four-cylinder type, which can be regarded as the standard of the industry.

In Europe the high cost of fuel has been the main reason why the manufacturers have endeavored to still further perfect the four-cylinder motor, but in America the tendency is, with pleasure cars, to disregard gasoline economy be-

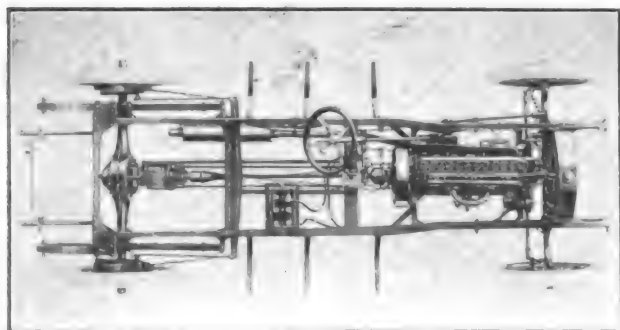


White Method of Heating the Carburetor from the Exhaust Manifold.

cause of the seeming general desire to avoid gear shifting. In Europe the engineers endeavor to build small motors and utilize four ratio gearsets, the desire being to change ratios very often. In America the motorists apparently wish to consume fuel for the purpose of minimizing gear changes. The greater power and flexibility of the sixes are the chief reasons why they are becoming popular.

The Knight sliding sleeve valve motor has been adopted by the Stearns and the Moline companies, but these have been used for considerable periods of time and are not to be regarded as new types.

Of the motors exhibited, the majority was the

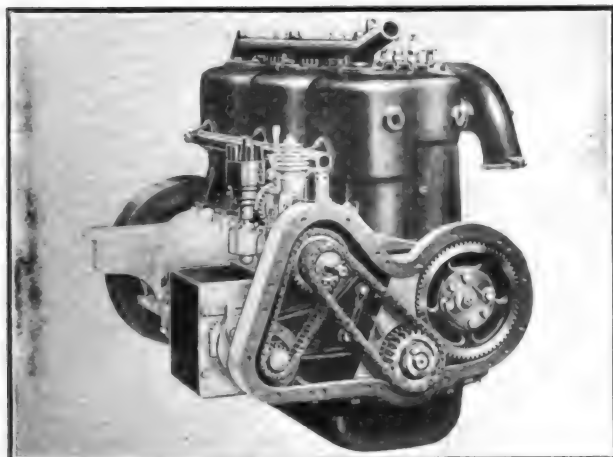


Top View of Studebaker Chassis, Showing Combination of Gearset and Rear Axle.

being of the class usually designated as "light sixes", which are generally sold for moderate prices, and there was practically as much inter-

L head type, there being comparatively small numbers of the T and I head constructions, and the overhead valve is found in but a few makes. There is a decided gain in the block cylinder castings, although in the larger machines the dual and triple-cylinder units are continued. The machines with separately cast cylinders are very limited in number.

With the block cylinder design practically all have large head plates, this affording access to the water jackets, insuring large water passages and free circulation of the cooling system. This construction has developed the use of the thermo-syphon circulation, which is very efficient, is practical and lessens the number of parts, although pump circulation is favored by the majority of designers. There is increasing use of the V shape radiators, these having an advantage of larger surface area, as well as being a depart-



The Use of Silent Chains for Driving Secondary Shafts in the Mitchell Motor.

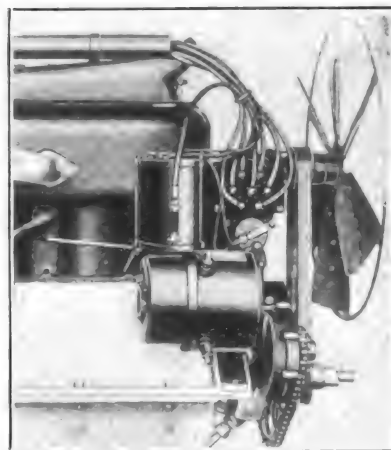
ure from the transverse or straight type which has had a continued vogue.

The combination mechanical force feed and splash systems of lubrication are largely used, these being regarded as the most dependable and certain than the splash system alone, but there are several using systems in which the oil is circulated by the flywheels, and others in which the lubricant is fed by pressure to all the main, connecting and piston pin bearings, the excess being thrown by centrifugal force to lubricate the cylinder and piston walls.

The majority of the motors are constructed with helical cut timing gears, and with hardly an exception these are operated in oil baths, while there has been an increase in the number utilizing silent chains for driving the secondary shafts. Besides the water and oil pumps, air

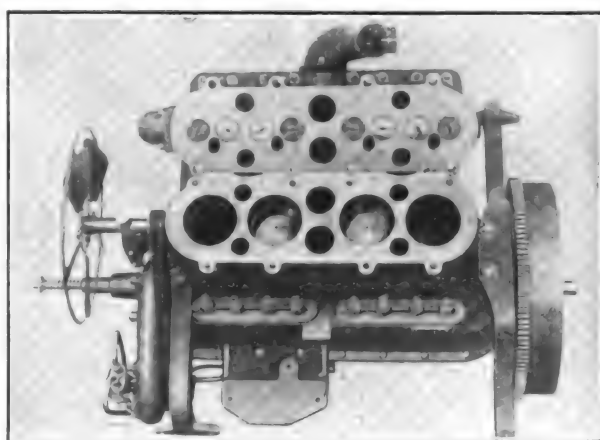
compressors, magnetos and the lighting and starting system are operated primarily from the crankshafts, usually by parallel shafting, but in some instances by cross shafts at the heads of the engines. So far as possible the gears and chains are constantly lubricated, which minimizes noise.

The demand for engine starting and electric lighting has necessitated the use



The Studebaker Magneto Location.

of generator and motor equipment, and there is a tendency to utilize the storage battery as a source for the current used for ignition, this being a return to the systems which were the vogue before the general adoption of magneto ignition. There is probability of the still greater use of storage battery ignition, although the magneto will not be discarded. Two separate sources of electric current will be even better insurance against ignition failure. Magneto manufacturers are constantly improving the instruments they build and the better knowledge of the motorists of these machines will mean greater endurance and increased satis-



The Detachable Head Type of Motor Used in Interstate Cars.

faction.

Many of the designers have given attention toward locating the carburetors more accessible

1000-MILE RACE FOR \$100,000.

IF THE plans of A. C. Newby, builder of National cars and director of Indianapolis speedway, materialize, Indianapolis, Ind., will be the scene of the



Eddie O'Donnell, Indianapolis Entrant.

greatest race ever held in this country. It is announced that he is considering plans for a race of 1000 miles with purses amounting to \$100,000, the participants being limited to cars that have won 500-mile events. The race will be invitational. To date there are four cars eligible, the Marmon, National, Delage and Peugeot, while the next 500-mile race may provide a fifth. This will insure the best talent in the racing world. One requirement for entry is that each car must qualify at a speed of 90 miles an hour for 20 laps of the speedway. During the contest drivers are to "spell" each other, there to be two drivers to a car, each alternating in driving 250-mile relays.

TWO MORE INDIANAPOLIS ENTRIES.

Eddie O'Donnell and Tom Alley have been entered in the next Indianapolis 500-mile sweepstakes to drive two Duesenbergs. The entries were made by Fred Duesenberg, builder of the machines and, according to the statement made, a third Duesenberg will be entered before the first of May. Both O'Donnell and Alley have been climbing fast the last few months, the former taking third place in the recent Corona road race at a speed of 85.74 miles an hour, and the latter annexing the world's 100-mile circular dirt track record at Minneapolis last fall, with an average of 65.57. Alley drove the last mile and a half of this contest on three tires.

In size the Duesenbergs will not be handicapped this year, as formerly, their cubic displacement being 299 inches, barely under the new ruling of the speedway.

RESTA WINS ON NASSAU TIRES.

But one set of Nassau tires was used by Resta in winning both the Grand Prize and Vanderbilt Cup races at the Panama-Pacific Exposition, according to his telegram to the manufacturer, the Thermoid Rubber Company, Trenton, N. J. Not only this, but after being driven the 700 miles over macadam and planking in both races, the shoes were in excellent condition at the finish. This is probably the first time that two international races were won with one set of casings.

"Resta drove his car equipped with Nassau stock tires", said D. C. Pohlman, sales manager of the Thermoid Company. "These tires differed in no way from our stock tires. They were exactly the same in quality and construction as those furnished to all our dealers".

Mr. Pohlman also pointed out that when Bob Burman defeated Barney Oldfield, Jan. 3, and broke the world's records from 10 to 50 miles, his car was equipped with Nassau tires. Nassau tires were used by De Palma when he won the Elgin national trophy, Aug. 22, 1914, with a Mercedes, three of the tires having been used the day before in the Cobe trophy race.

The other four Nassau tire equipped cars at the Panama-Pacific Exposition races also made excellent showings, both when driven



Tom Alley, Who Will Drive a Duesenberg Car at Indianapolis.

through the mud in Grand Prize contest and on the ideal course for the Vanderbilt Cup.

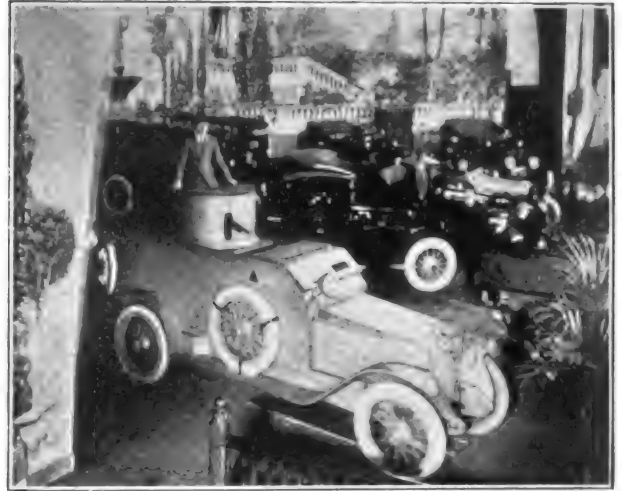
BOSTON EXHIBITORS REPORT BIG SALES.

IN THE following pages will be found the expressions of the exhibitors of the 1915 Boston automobile show. In preparing statements of actual conditions of business, sales and prospects at the show, The Automobile Journal representatives visited every space at the show and took the verbatim report of the exhibitors. The consensus of opinion is that the 1915 show is the greatest in the history of the industry from the standpoint of business. All exhibitors stated that their sales are far in excess of those of 1914, which was the previous banner year, and a great number stated that the results of this exhibition will be far greater than from New York or Chicago expositions.

The pleasure car exhibitors believe they will have their greatest year, and all state that in addition to the actual sales and A-1 prospects, there is a decidedly optimistic note in the questions asked by visitors. These, they say, are different from previous years, indicating clearly that the general public does comprehend the motor car mechanically. Exhibitors of accessories, many of which were shown for the first time, say that their sales have exceeded all expectations. In the truck department comment was made that 1915 would be the greatest year in the history of the industry. Sales in this department were very largely in excess of those of 1914 for every concern.

In addition to being a record year for retail sales, a new high mark was established for deal-

ism is manifested at every space and from the actual results of the week there is reason to believe that 1915 will be the greatest in business



The Armored Packard Car.

and production in the history of the automobile industry. The following quoted statements specifically relate to sales and business during the first three days of the show:

PLEASURE CARS.

Packard Motor Car Company of Boston, 1089 Commonwealth Avenue, Boston, Mass.; Factory, Detroit, Mich.: "Just refused a \$4,000,000 order for motor trucks for foreign service in order to supply the domestic demand, which during the last few weeks has been extremely good. The Packard Motor Car Company is displaying an armored car which has been attracting large crowds and creating much comment and interest".

Fred S. Smith, 38 Columbus Avenue, Boston, Mass.; Factory, Mercer Automobile Company, Trenton, N. J.: "Our Sportabouts are completely sold out; couldn't buy one as agent for immediate delivery. Factory is working day and night on orders and has many orders ahead".

The J. W. Bowman Company, 91 Massachusetts Avenue, Boston, Mass.; Factory, the Waverly Company, Indianapolis, Ind., and Maxwell Motor Company, Detroit, Mich.: "Best show ever participated in. People ask intelligent questions. We have had 100 per cent. increase in prospects for electric vehicles".

Locomobile Company of America, 700 Commonwealth Avenue, Boston; Factory, Bridgeport, Conn.: "Exceedingly good business. There is a big demand for specially designed bodies, this department of our business being under M. J. Frank de Causse, formerly of Kellner et Ses Fils, Paris".

J. H. MacAlman, 86 Massachusetts Avenue, Boston, Mass.; Factory, F. B. Stearns Company, Cleveland, O.: "Pleased to say we are having a very good business and even better prospects for future business. In fact, the automobile business seems to be on the rebound".

Stanley Motor Carriage Company, Newton, Mass.: "Great interest is being exhibited in our new model 720, five-passenger, 20-horsepower, this being its first appearance, not even the dealers having seen it before".

Cadillac Automobile Company of Boston, 664 Commonwealth Avenue, Boston, Mass.; Factory, Detroit, Mich.: "Wish we had the Boston Common to handle our



General View of Pleasure Cars in Department B.

ers' contracts. Practically every company at the show has large dealers' orders, and many new agencies have been closed. The spirit of optim-

business. We are making sales, the volume of which we never dreamed possible".

Anderson Electric Car Company, 803 Boylston Street, Boston, Mass.; Factory, Detroit, Mich.: "Show business has been wonderful; even better than that at the recent electric car show. It is the right time of the year to sell".

Winton Motor Car Company, 674 Commonwealth Avenue, Boston, Mass.; Factory, Cleveland, O.: "More live buyers here than at any previous show. It is an astonishing condition considering what general business conditions have been, and I do not see how we are going to take care of the sales after the show".

Frank E. Wing, New England Distributor for the Marmon Car, 562 Commonwealth Avenue, Boston, Mass.; Factory, Nordyke & Marmon Company, Indianapolis, Ind.: "Business far in excess of any previous year. Business in Boston has been picking up for the past four months, and we are making many sales without trading".

Beacon Motor Car Company, 660 Beacon Street, Boston, Mass.; Factory, Peerless Motor Car Company, Cleveland,

after when the touring season has begun".

Jackson Motor Car Company, 1109 Commonwealth Avenue, Boston, Mass.; Factory, Jackson, Mich.: "Sold every car on exhibition and closed up with 10 new dealers. Now taking orders for factory delivery and are having a great business. Best show ever been in".

C. P. Rockwell, Inc., 640 Commonwealth Avenue, Boston, Mass.; Factory, the Thomas B. Jeffery Company, Kenosha, Wis.: "We are doing 33 1/3 per cent. more business than at any other show and we consider it to be the best show we ever were in".

Fiat Motor Sales Company, 841 Boylston Street, Boston, Mass.; Factory, Poughkeepsie, N. Y.: "Our business is meeting our most optimistic expectations, and we are developing very good prospects which we expect to realize upon soon".

Chevrolet Motor Company of New England, Motor Mart, Park Square, Boston, Mass.; Factory, Flint, Mich.: "Have sold 25 cars at retail during first half of the week, which does not include the wholesale business we have done. Tremendous interest is shown in our 'Four-Ninety'".



Looking Through Exhibition Hall to Entrance of Building—One of the Most Crowded Aisles in the Whole Building, 50,000 People Passing Here Daily.

O.: "More business at this show than any previous show in Boston. Extremely well pleased in every way".

J. W. Maguire Company, 745 Boylston Street, Boston, Mass.; Factory, the Pierce-Arrow Motor Car Company, Buffalo, N. Y.: "Sales very good. For the year they are over 50 per cent. ahead of 1914. Sold four or five cars for first couple of days. Don't know when conditions have been as bright".

Chandler Motors of New England, Inc., 1108-1110 Boylston Street, Boston, Mass.; Factory, Cleveland, O.: "Extremely satisfactory. Cut in price has made Chandler a big selling feature. Sales are far in excess of last year".

F. A. Dutton Motor Company, Inc., West Somerville, Mass.; Factory, Consolidated Motor Car Company, Detroit, Mich.: "Business way ahead of 1914 in every way. New eight-cylinder car attracting a great deal of attention and many orders have been taken".

Paige Motor Company of Boston, 889 Boylston Street, Boston, Mass.; Factory, Detroit, Mich.: "Beats the New York show. We are having very good sales, but expect to close a larger number about two or three weeks

Scripps-Booth Motor Car Company, 616 Commonwealth Avenue, Boston, Mass.; Factory, Detroit, Mich.: "The capacity of our factory is 40 cars a day, and we expect to get enough orders before the touring season opens to keep the factory busy for a long time".

A. T. Hart Company, 1020 Boylston Street, Boston, Mass.; Factory, National Motor Vehicle Company, Indianapolis, Ind.: "Show sales surprising in every respect. Volume of business is greater than at any previous show. The estimates of sales were more than doubled".

King Motor Car Company, 650 Beacon Street, Boston, Mass.; Factory, Detroit, Mich.: "Best auto show I have attended this year and best Boston show I have attended. Retail sales have exceeded all expectations. We sold 13 King eights during first two days of the show, and we are making deliveries as fast as we sell".

Saxon Motor Company, 620 Commonwealth Avenue, Boston, Mass.; Factory, Detroit, Mich.: "Sales of the new six are phenomenal. We have made more retail sales and dealers contracts than we have ever handled before at one show".

Kissel-Kar, New England Branch, 940 Commonwealth Avenue, Boston, Mass.; Factory, Hartford, Wis.: "We are over 700 per cent. ahead of 1914. Up to the Boston show we were 450 per cent. ahead of last year's sales



Accessories Shown in the Balcony.

figures, and with the show sales we have exceeded the 700 per cent. figure. These represent actual sales".

Cole Motor Company, 94 Massachusetts Avenue, Boston, Mass.; Factory, Indianapolis, Ind.: "Sold our first car at 6 o'clock Saturday. Actual sales ahead of all previous years. Have over 5000 good prospects from the show. Closed with many agents. Business in general is fine".

W. L. Russell Company, Motor Mart, Boston, Mass.; Factory, the Haynes Automobile Company, Kokomo, Ind.: "Great week. Everything satisfactory. Say for us that we are very well pleased. Sales ahead of last year by far".

Donovan Motor Car Company, 626 Commonwealth Avenue, Boston, Mass.; Factory, Studebaker Corporation, Detroit, Mich.: "It is significant to note that not one purchaser or prospective purchaser has mentioned the European war. All are talking business and all look forward to a dandy spring".

Chalmers Motor Company of Massachusetts, Inc., 620 Commonwealth Avenue, Boston, Mass.; Factory, Detroit, Mich.: "Sales are wonderful, exceeding everything in the line of previous shows or in anticipated volume. We look forward to a great spring for selling".

Pope-Hartford Company of Boston, 591 Boylston Street, Boston, Mass.; Factory, Mitchell-Lewis Motor Company, Racine, Wis.: "Great business. We are tickled to death. Sales for the first three days exceed the whole week of the 1914 show".

Eds & Loud, Boston, Mass.; Factory, Premier Motor Car Company, Indianapolis, Ind.: "Our new line has been successful at this show. It has attracted a great deal of retail trade, and our agent deals have exceeded all other shows".

Charles Motor Company, 940 Commonwealth Avenue,

Boston, Mass.; Factory, Inter-State Motor Company, Muncie, Ind., and Briscoe Motor Car Company, Jackson, Mich.: "Revelation to us. Completely carried away with the business done at the show. By far the best show I have attended this year".

Ford Motor Company, Cambridge, Mass.; Factory, Detroit, Mich.: "Never had such good business before. For first three days we have sold triple the number of cars we sold during the whole week of the 1914 show. Less sightseers and more people who mean business. Biggest volume of show business we have ever experienced".

Buick Boston Company, 97 Massachusetts Avenue, Boston, Mass.; Factory, Flint, Mich.: "On the wholesale end we are so far ahead of 1914 that there is no comparison. Sold out our complete allotment for the whole year. On retail sales we have sold out our entire allotment for March, April and May. Sales are simply wonderful".

Lenox Motor Car Company, 18 Columbus Avenue, Boston, Mass.; Factory, Hyde Park, Mass.: "Show sales over double those of 1914. Outside business is in the same proportion, and the prospects are the best in the history of our company".

Oakland Motor Company, 100 Massachusetts Avenue, Boston, Mass.; Factory, Pontiac, Mich.: "Things are just simply wonderful. We are making record breaking sales and are sewing up a great number of dealers. All the way through we are doing a nice, clean, substantial and wholesome business: a business that is going to be permanent".

Velle Motor Vehicle Company, 16 Amherst Street, Cambridge, Mass.; Factory, Moline, Ill.: "Far better pleased than we expected to be. Volume of sales is 75 cars ahead of any previous year at this time".

The Henley-Kimball Company, 652 Beacon Street, Boston, Mass.; Factory, Hudson Motor Car Company, Detroit, Mich.: "Business at this show is as good as last year and probably will be better at end of the week. Business for the next 60 days looks very good".

Franklin Motor Car Company, 616 Commonwealth Avenue, Boston, Mass.; Factory, Syracuse, N. Y.: "Ours is the only air-cooled car on exhibition, and it is attracting great interest. We sold seven in the first three days of show".

Connell & McKone Company, 167 Massachusetts Avenue, Boston, Mass.; Factory, Willys-Overland Company, Toledo, O.: "We expect to make over 100 eastern sales



Motorcycle Display in Department D, Which Attracted Great Attention.

principally through agents before the show closes. February was the best month we have had".

Stutz Motor Car Company, 895 Boylston Street, Boston, Mass.; Factory, Indianapolis, Ind.: "The Stutz has

been going through a laboratory test as a racing car heretofore. Now we are making sales and are doing a very good business".

Herr-Brooks Corporation, Indianapolis, Ind.: "Very good business. Visitors display great interest in our cars, and we are developing good prospects".

Wheelock-Jeffrey Company, 916 Commonwealth Avenue, Boston, Mass.; **Factory**, Olds Motor Works, Lansing, Mich.: "We are having the best business we ever had, much better than we had even at the New York show".

Metz Company, 907 Boylston Street, Boston, Mass.; **Factory**, Waltham, Mass.: "The new Metz 22 has proved to be a genuine sensation in automobile value, and we are breaking all records for local sales. The factory has made plans for a largely increased production and the war in Europe will not in any way effect our business".

Linscott Motor Company, 163 Columbus Avenue, Boston, Mass.; **Factory**, Reo Motor Car Company, Lansing, Mich.: "Best show we have been in. We expect to sell

exhibit covers every possible field and our sales show that there is more than interest displayed this year. Sales are equal to any of the big banner years".

General Vehicle Company, Inc., Cambridge, Mass.; **Factory**, Long Island City, N. Y.: "The exhibit of G. V. Mercedes gasoline trucks has created great interest and the prospects are extremely bright. The company's standard line of electric trucks is the best known in the industry".

Winton Motor Car Company, 674 Commonwealth Avenue, Boston, Mass.; **Factory**, Cleveland, O.: "Conditions excellent. Sold out our exhibit".

Robinson Fire Apparatus Manufacturing Company, 136 Federal Street, Boston, Mass.; **Factory**, St. Louis, Mo.: "Results far in excess of 1914 and with the actual sales and appointments we have made we are very well satisfied, to say the least".

International Harvester Company of America, 43 Somerville Avenue, Somerville, Mass.; **Factory**, Chicago, Ill.: "Sales are equal to 1914 and they were great last year.



Rear of Grand Hall, Showing Bas-Reliefs of Celebrated Frieze of Parthenon Hung on Balconies Encircling Hall.

at wholesale and retail 125 cars, judging from the sales of the first half of the week".

Dort Motor Car Company, Flint, Mich.: "We are sewing up agencies as fast as we can with them with our new car. Business is very good".

COMMERCIAL CARS.

Kissel-Kar, New England Branch, 904 Commonwealth Avenue, Boston, Mass.; **Factory**, Hartford, Wis.: "Truck sales at the show are more than 70 per cent. ahead of the 1914 exhibit, and the same proportion of increase applies to general sales. We have sold everything on the floor".

New England Truck Company, Fitchburg, Mass.; **Factory**, Fitchburg, Mass.: "We are here to get agencies and we are getting them. Prospects are brighter than we have ever seen them before".

The White Company, 930 Commonwealth Avenue, Boston, Mass.; **Factory**, Cleveland, O.: "Our complete line on

Prospects are better than they have ever been".

Packard Motor Car of Boston, 1089 Commonwealth Avenue, Boston, Mass.; **Factory**, Detroit, Mich.: "There are 200 new features in the Packard three-ton truck, which is attracting great attention. The one-ton truck is exhibited here for the first time. We are getting so many orders we are thinking of getting a drop box in which customers can drop their orders".

Rowe Motor Manufacturing Company, Downingtown, Penn.: "This is the initial bow for our truck, and we are meeting with phenomenal success. The Rowe truck is a pioneer in the use of the worm drive system".

Lippard-Stewart Motor Car Company, 15 Hayward Street, Cambridge, Mass.; **Factory**, Buffalo, N. Y.: "Business is very good. We have established 22 new agencies for our cars since last August".

Linscott Motor Company, 163 Columbus Avenue, Boston, Mass.; **Factory**, Reo Motor Car Company, Lansing, Mich.: "Bully business. The Reo 1500-pound truck is attracting great attention. Expect enough orders to keep

the factory busy turning out 100 a day".

R. E. Taylor Corporation, 915 Boylston Street, Boston, Mass.; **Garford Motor Truck Company, Inc., Lima, O.:** "Garford trucks have made good in all lines of work. Sixty-six per cent. of Garford sales have been repeat orders. For war purposes more than 400 were sent to Europe on one order".

C. P. Rockwell, Inc., 640 Commonwealth Avenue, Boston, Mass.; **Factory, the Thomas B. Jeffery Company, Kenosha, Wis.:** "Statement was made during the second day of the show that our factory had received an order for 675 one-ton Jeffery trucks for the French government, and another for 350 Jeffery Quads for Russia".

J. C. Tucker Company, Narragansett Pier, R. I.; **Factory, Chase Motor Truck Company, Syracuse, N. Y.:** "This company has been one of the largest producers of motor trucks in the world. Of all the gasoline motor trucks used in the United States one in every 15 is a Chase".

ACCESSORIES.

Chas. E. Miller, 97 Reade Street, New York City: "Sold \$150 worth of our new Ford hoods on Tuesday, and ex-

nue, Detroit, Mich.: "The 'Off-and-On' tire toll for clincher tires is going like hot cakes. Have sold 150,000 since the New York show".

Green & Swett Company, 737 Boylston Street, Boston, Mass.: "We expect to do a big business the last of the week. We have taken 50 cents off the price and include a quarter of a pound of raw stock with each sale".

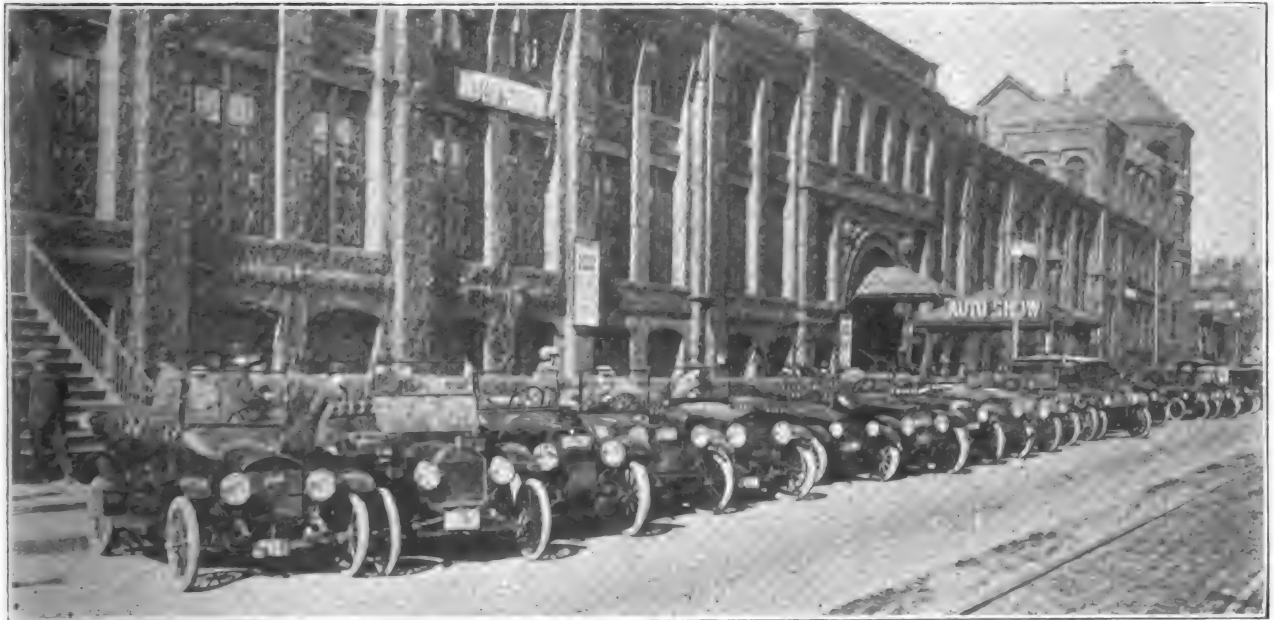
Continental Asbestos Corporation, Worcester, Mass.: "We are receiving large orders for lubricants; one received this week amounted to several hundreds of dollars".

Braender Rubber & Tire Company, Rutherford, N. J.: "We are closing up our New England territory, appointing a new agent for Boston this week".

X Laboratories, 630 Washington Street, Boston, Mass.: "Everything fine. Sales better than at the New York show. Plenty of dealers have been secured through the show and prospects are the brightest ever".

The Miller Rubber Company of New York, 48 Gloucester Street, Boston, Mass.: "We couldn't desire anything better. Have secured dealers right and left. In fact there is nothing better in the world than the Boston show for business".

Standard Oil Company of New York, New England



Exterior of Mechanics' Hall, Showing a Small Portion of Visitors' Cars That Were Parked Here from Early Morning to Late Evening—Several Exhibitions Were Held Outside.

pect to sell 10,000 Miller's Porce Spark Plugs before end of show".

Charles A. Jackson, Motor Mart, Boston, Mass.: "Excellent business in the J. M. Shock Absorbers. We have closed four good contracts with dealers".

The Texas Oil Company, 120 Boylston Street, Boston, Mass.: "Doing a very good business in tank outfits and self-measuring pumps".

Standard Woven Fabric Company, Framingham, Mass.: "Our Multibestos and automobile fabrics are getting the crowds, and we are doing a very satisfactory business".

Universal Shock Eliminator, Inc., 3251 Broadway, New York City: "We are doing three times the retail business we did in New York or Chicago shows".

Spedolene Lubricant Company, Malden, Mass.: "Spedolene and Gearolene are bringing us the business we expected".

Ahlberg Bearing Company, 93 Massachusetts Avenue, Boston, Mass.: "Our sales are very good, but we value most the opportunity offered by the war to educate people to having ball bearings reground.

Wonder-Mint Company, 14 Federal Street, Boston, Mass.: "This is the best show of the season and our sales are better than last year".

Stewart Accessories Company, 820 W. Warren Ave-

Department, 50 Congress Street, Boston, Mass.: "Better business than at any previous Boston show, which is saying something. Big orders have been received every day, and the volume of sales is astonishing".

B. W. Spittler, 52 Claybourne Street, Dorchester, Mass.: "I have been in 18 shows this season, all the way from Los Angeles, Chicago and New York, but this is the greatest of them all from the standpoint of sales and actual business done. We couldn't possibly ask for anything better".

Lee Tire Sales Company, Motor Mart, Park Square, Boston, Mass.: "Business is booming. Our sales show a 200 per cent. increase since Jan. 1 compared with the same period of 1914, and this is supposed to be the dull-est months of the season".

John V. Willson Company, 220 Pleasant Street, Boston, Mass.: "Conditions are excellent. We are away ahead of last year in matter of sales. The Apco specialties seem to be largely in demand and the prospects are par excellence".

Ellis-Ward Company, 817 Boylston Street, Boston, Mass.: "We are selling tires to the extent of \$1000 a day since the opening of the show. Sales are far in excess of 1914, and we are extremely optimistic in every respect".

PREPARING FOR GREATEST TOURING SEASON.

AMERICAN Automobile Association clubs throughout the country are making extensive preparations for what promises to be the liveliest touring season since the introduction of the self-propelled vehicle. At the two national clearing houses, in New York City and Washington, D. C., the volume of inquiries has been astounding, according to Chairman F. X. Mudd of the A. A. A. touring board, who predicts, in 1915, a wonderful roads intermingling of the people of the several states.

Both the Northwest and the Southwest intend to have their share of the substantial interstate travel which will be accelerated by the Panama-Pacific exposition, and while the Lincoln highway will be a busy thoroughfare, it will not have a motor car monopoly.

The Automobile Club of Seattle has started a campaign for the Northwest Trail, and is coupling with it a combination of the Lincoln highway, which will take the cross-country traveller from Cheyenne diagonally across Wyoming, touching and possibly entering Yellowstone park—if roads construction now in progress is completed—and continuing across Montana, with a side trip to Glacier National park made possible by the road constructed by the Flathead Motor Club of Kalispell; then through Washington by way of the Snoqualmie pass into Seattle.

Journeying southward over the Pacific highway there will be opportunity to drive in Rainier National park, and in Oregon visit Crater Lake National park, besides taking a look at the famous Columbia river highway, which begins at Portland. The Yosemite Valley park is now available to motor cars, and it is within easy distance of San Francisco, where the California State Automobile Association headquarters within the grounds will be prepared to help all touring motorists.

The Automobile Club of Southern California, with headquarters in Los Angeles, has given its particular attention to the National Old Trails route, which it has sign-posted all the way to Kansas City, Mo. For those who start early in the year this route will appeal, and it will also command the attention of those who return late in the fall. A percentage of these will also make the side trip to the Grand canyon, drop down to Phoenix and then follow the route of the All-Southern National highway across Texas, Arkansas, Tennessee, North Carolina and Virginia to Washington, D. C.

Colorado doesn't intend to be overlooked, and the large number of road travellers which the state entertained last year has accelerated its mountain road building until much can be offered to motorists. When a Colorado delegation, headed by Governor Carlson and former Governor Ammons, recently urged Congress to act favorably on the bill to create a Rocky Mountain National park out of 360 square miles of forest reserve in that state, the keynote of the plea was "to turn back the tide of tourist travel to Europe, and direct it to the beauty spots of America". Congress acted favorably upon the request, and its action indicated the growth of sentiment towards the utilization of American scenic attractions.

Secretary of the Interior Lane in a recent interview said: "The first step in conservation taken by our people was to save scenery—not water, or coal, or forests; but scenery! That's what we did when we led the world by setting aside our great national parks—Yellowstone, Glacier, Mount Rainier, Yosemite and the others. These we hope to make more surely pleasure places for the people by securing roads that will stand automobile traffic. Already within three days of New York the tourist can find scenery that cannot be approached anywhere in Europe".

ISSUES GOOD ROADS REPORT.

Persons interested in the good roads problem, either from the engineering or the legislative standpoint, will find the report of the joint congressional committee on federal aid to good roads a convenient source of information. It not only contains the most extensive data ever published on this subject, but also a bibliography which gives a list of books, pamphlets and speeches on all phases of the good roads problem. The report is printed as House Document 1510, Sixty-Third Congress, Third Session, and copies may be secured by application to members of Congress.

ROAD EXPENDITURES \$204,000,000.

According to the report of the joint congressional committee on federal aid to good roads, the annual expenditures for road improvement in the United States amount to about \$204,000,000. Automobile license fees amount to about \$8,000,000 annually.

GENERAL NEWS OF THE INDUSTRY

The Studebaker Corporation Reports Record Sales for 1915 Production—Oldsmobile Shipments are Setting a High Mark—Lozier Factory Resumes Operations.

BELIEF that 1915 will be record breaking for the automobile industry is expressed by nearly every motor car manufacturer. The Studebaker Corporation, Detroit, Mich., is sending trainloads of cars to every important distributing point in the country, a policy instituted this year. Dealers have waited until late in March or April before taking cars in any quantity, causing a shortage and delaying shipping. This resulted in loss of sales.

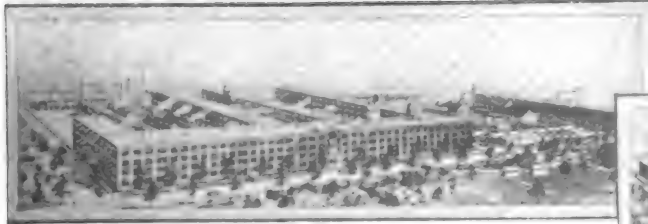
Speaking of a recent trainload shipment of Studebakers to the Kansas City branch, R. T. Hodgkins, assistant sales manager of the Studebaker Corporation, says: "This indicates the progressiveness and foresight of the Kansas City dealer in insuring himself against an almost inevitable shortage of Studebaker cars in March

and as many Studebaker cars the first week of January this year as it did the same week last year. I have a hundred other instances which indicate good business conditions throughout the world".

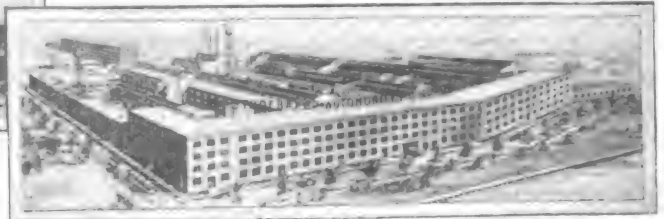
The work of Paul Hale Bruske, former publicity manager for the Studebaker Corporation, has been taken up by G. L. Willman, advertising manager, with the assistance of the Frank Seaman Agency, Inc., New York City. Mr. Willman is directly in charge of both advertising and publicity, having his headquarters in Detroit.

FRANKLIN GIVES LARGE BODY ORDER.

The American Automobile Body Company, Buffalo, N. Y., has contract with the H. H. Franklin Manufacturing Company, Syracuse, N. Y., to construct 3000 automobile bodies. This is one of the largest orders placed this year, and to deliver these bodies a large force of work-



Partial View of the Studebaker Corporation's Plants, Detroit, Mich., Where 35,000 Cars Will Be Turned Out During 1915.



and April. He distributed this trainload to his dealers and they have had no trouble in disposing of entire lot throughout Kansas and Oklahoma.

"The Coburn Motor Car Company, Norfolk, Va., has just opened a very handsome sales room and warehouse with an investment of \$100,000. This company is an exclusive retailer and distributor of Studebaker cars. Another indication of the status of our business is the recent opening of the new sales and distribution headquarters of the Blevins Auto Sales Company, Toledo, O., with an investment of \$100,000. In conjunction with its opening, the Blevins Company received a 40-car shipment of Studebaker machines. This is the largest investment in automobiles ever made in a single shipment for distribution in Toledo and nearby points.

"Our New York retail store sold four times

force of workmen must be employed in order to get the contract finished.

PIERCE-ARROW ON FULL TIME BASIS.

The Pierce-Arrow Motor Car Company, Buffalo, N. Y., which employs about 5000 workmen when running at full capacity, is operating its factory full time. The company's working force is being increased, and the outlook for spring business is satisfactory in every respect.

INCREASE OUTPUT OF STANWELD.

The Standard Welding Company, Cleveland, O., has added 79 men to its working force in the automobile rim department.

This increase was made necessary by the orders on hand from automobile manufacturers.

OLDSMOBILE TRAINLOAD SHIPMENTS.

The Olds Motor Works, Lansing, Mich., states that present conditions assure an excellent spring business. The first trainload order for the model 42 Oldsmobile touring cars, which originated with C. H. Larson, New York City, was for 120 cars, and when loaded these will fill 42 freight cars, making 42 carloads of the new model 42 Oldsmobile.

J. B. Hall, sales manager of the company, states that it in one year made an increase of more than 700 per cent. in its selling organization, and that this resulted from the popularity of the four-cylinder car, since a large number of its

of 1913; Chicago showed an increase of 330 per cent. for this period, Los Angeles 200 per cent., Detroit 150 per cent., the State of Pennsylvania 391 per cent., the State of Ohio 500 per cent., and the State of California 417 per cent.

NATIONAL CARBON'S NET \$2,215,880.

The National Carbon Company, New York City, had a net income of \$2,215,880, for the calendar and fiscal year ending Dec. 31, 1914. Against this has been charged \$372,750 for preferred dividends, \$582,930 for common dividends, \$389,872 for depreciation, \$25,000 reserve for bonus to employees and subscribers to capital stock, \$19,708 for customers' accounts written off, and a balance of \$825,618 has been credited to the profit and loss account.



The Model Plant of the Olds Motor Works, Lansing, Mich., Which Is Turning Out a Record Number of

agents were appointed after model 42 was announced. Mr. Hall states that the November, 1914, deliveries were greatly in excess of those of November, 1913, while in September and October, 1914, the shipments were seven times greater than for the corresponding period of 1913. Between Aug. 1 and Dec. 1, 1914, says Mr. Hall, his company delivered 624 per cent. more automobiles than during the same months of 1913, and that orders in hand assure the company against any appreciable slackening in shipments of cars during the spring months.

A substantial increase in demand for cars in large cities is a further evidence of prosperity. In New York City an increase in deliveries of more than 540 per cent. was made between Aug. 1 and Dec. 1, 1914, over the corresponding period

This concern now has 10 factories manufacturing lighting carbons, carbon brushes, carbon electrodes, carbon specialties, wet batteries, flashlights and flashlight batteries, standard dry batteries, storage batteries, electric starters, automobile accessories and specialties. The company is completing a large new factory in Long Island City, which will afford the American Ever Ready branch increased facilities.

WEIDELY MOTOR COMPANY FORMED.

The Weidely Motor Company, 133-143 South West street, Indianapolis, Ind., has been formed to manufacture Weidely motors. George A. Weidely, who has been responsible for the engineering of Premier cars since 1902, has associated

himself with a number of well known business men to build Weidely motors for the trade. Weidely designed motors have been a standard product for many years. As produced today this engine represents experience with hundreds of cars in the hands of all classes of men, and its refinements are based upon exhaustive tests that have increased economy, power and speed. Greater simplification and decreased number of parts, and important reduction in weight and overall dimensions of the motor are among the significant changes in the motor the company will build.

W. E. Showers is president of the new Weidely Motor Company. The other officers are: George A. Weidely, vice president and general manager; W. A. Umphrey, treasurer, and L. A. Poundstone, secretary. The directors named to

LOZIER FACTORY IN OPERATION.

Quantity production has again begun at the Lozier Motor Company, Detroit, Mich., and car-load shipments of fours and sixes are now being made. Samuel Frank, general manager of the company, in speaking of the new operations, said: "Additional help is being taken on to increase production and we expect to be working at full capacity within a short time. Under the new arrangement the old Plattsburg, N. Y., factory has been discontinued. We shall concentrate activities at the Detroit plant".

BIG RUBBER EARNINGS FROM WAR.

The European war brought to the United States Rubber Company, New York City, a total



Oldsmobiles for the 1915 Season—This Works Recently Shipped a Trainload of 42 Cars to New York City.

date include: Edmund Rosenberg of Indianapolis, and George Hughes, president of the Pike's Peak Ocean-to-Ocean Highway Association.

CORNELIAN MOVES TO ALLEGAN.

The Blood Brothers Machine Company has moved its plant from Kalamazoo, Mich., to Allegan, Mich. The company states that this move is made necessary in connection with its entering the field of light car manufacture with the Cornelian car. A Cornelian has been entered in the next 500-mile Indianapolis speedway race, the smallest car to enter this racing classic. It will be driven by Louis Chevrolet, a noted racing driver.

of \$1,500,000 in business during December, according to Samuel P. Colt, president, in his annual report for the year ended Dec. 31, 1914. The total sales for the year were \$83,678,812, and net profits, after interest charges, amounted to \$7,868,223. Earnings were equivalent to approximately eight per cent. on the common stock, after payment of preferred stock dividends. President Colt says that the company has \$10,000,000 cash on hand, representing more than 50 per cent. of the company's current liabilities.

REGULAR PACKARD DIVIDEND.

The Packard Motor Car Company, Detroit, Mich., has declared its regular quarterly dividend of $1\frac{3}{4}$ per cent. on the preferred stock, payable March 15 to stock of record March 14.

HENDERSON ON PACIFIC COAST.

C. P. Henderson, general sales manager of the Cole Motor Car Company, Indianapolis, Ind., is making a tour of the West, which will include Butte, Spokane, Seattle, Portland and San Francisco. Mr. Henderson is to close a distributing contract in San Francisco, and it is stated that this will probably be for the State of California. Another similar contract may be made to cover the northwestern states.



C. P. Henderson, Sales Manager of the Cole Motor Car Company.

Mr. Henderson says that the Cole Company has made a new sales record with its latest models, not only in eights, but in fours and sixes. The company's production will be doubled for March and maximum output will be maintained from that month.

J. H. McDEARMON JOINS OAKLAND.

J. H. McDearmon, who was associated with the John Deere Plow Company, Kansas City, Mo., for 11 years, has resigned to become assistant sales manager of the Oakland Motor Company, Pontiac, Mich. He is the 10th man who, after winning success in the selling organization of the Deere Company, has been persuaded by F. W. Warner, general sales manager of the Oakland Company, that in the automobile business he can be even more successful.



J. H. McDearmon, Assistant Sales Manager of the Oakland Motor Car Company.

Mr. McDearmon was assistant manager and sales manager of the John Deere Company. His

business career has been a success because he is a born salesman and has the ability to stimulate those working under him to their best efforts, and because he earned promotion from a call boy's job, and has a knowledge of every phase of salesmanship. He started his career with the Kansas City Agricultural Implement Company, which after a few years was consolidated with the Moline Plow Company. Later he joined the Deere-Mansur Company and was with this concern for a number of years. He then engaged in another business until he became associated with the John Deere Plow Company in 1905.

DOOLITTLE WITH ZENITH COMPANY.

Albert H. Doolittle has discontinued the Automobile Trade Paper Advertising Agency he has conducted at Detroit, Mich., to become advertising manager of the Zenith Carburetor Company of that city. The Zenith business has so increased that its publicity requires all his time, and Mr. Doolittle relinquishes his agency with the belief that his new connection will have a big future. Mr. Doolittle is widely known in the automobile industry.



A. H. Doolittle, Advertising Manager Zenith Carburetor Company.

The Zenith Carburetor Company is prepared for the best year's business in its history. With its foreign plants closed, or crippled for help, the entire production will be at Detroit.

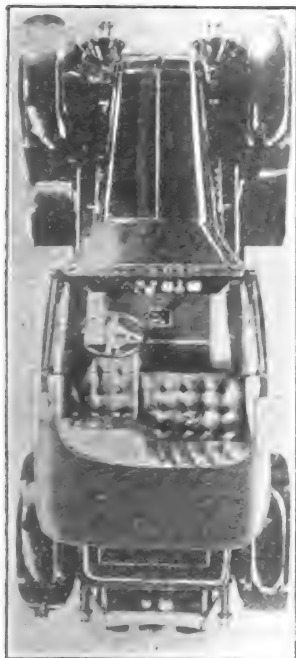
STUDEBAKER EARNS \$4,800,000.

For the fiscal and calendar year ended Dec. 31 last, the Studebaker Corporation, Detroit, Mich., made the reported record earnings of \$4,800,000, equal to 12½ per cent. on its common stock.

Surplus after charges for 1913 was \$3,904,413, and for 1912, \$2,940,251.

NEW CLOSED BODIES FOR CHANDLER CARS

THE Chandler Motor Car Company, Cleveland, O., is producing an entirely new series of open and closed car body types for the present season, and in these designs the streamline effect is improved, noticeably so in its sedan, coupe, cabriolet and limousine models.



Aeroplane View of the Chandler Cabriolet—Note Seating Arrangement.

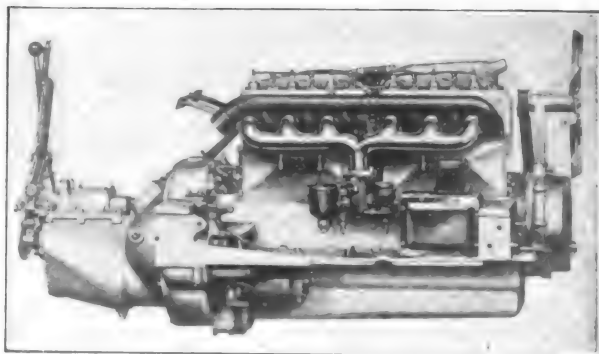
The Chandler engineers have in no way changed the design of the car's power plant, which is practically the same as for the past two seasons. A detailed description of Chandler car was recently published in *The Automobile Journal*, but a brief resume follows. The six-cylinder L head motor is of cylinder units, cast in blocks of three, with bore of $3\frac{3}{8}$ inches and a stroke of five, and has a horsepower rating of 27.40 by the S. A. E.

formula. All valves are enclosed and a silent motor has been built by using imported silent chains to operate the cam, pump and magneto shafts. The ignition system consists of a high-tension Bosch magneto and Bosch spark plugs. A Gray & Davis electric generator is used for the lighting, and the motor is fitted with a Gray & Davis starting motor. A spiral cut drive shaft pinion and master gear insure an exceptionally quiet rear axle.

Of the new Chandler body styles in the limousine, all front seats are upholstered in leather, having space for driver and one passenger. The rear compartment has a 47-inch seat, with generous seating accommodations for three. The two extra seats may be folded, but when in use the passengers may sit facing either direction. The windows in the two rear doors are adjusted by patent regula-

tors to any desired position. The limousine is exceptionally light, weighing 3175 pounds.

The sedan model is an owner-driver type, with all passengers enclosed. The rear seat, like that of the limousine, is 47 inches wide, seating three people. The front seat folds when not in use to give access to the driver's seat. The weight of the sedan fully equipped is 3125



Intake Side of the Chandler Six Motor, Showing Arrangement of the Starting Lighting Systems.

pounds.

The coupe will seat two passengers facing forward, and has a corner seat for the third passenger facing rearward. This model weighs 3050 pounds. The Chandler cabriolet is an admirable car for all-year-round use. Two passengers, exclusive of the driver, facing forward, can be carried. With the leather top and side windows in position the car is ideal for winter driving, having all the advantages of a coupe. With the top windows lowered the cabriolet has the appearance of a fine looking roadster model. The windows fold into the doors. To enclose the car the doors are



The Chandler Light Six Three-Passenger Coupe.

opened, the windows raised and close the doors. On all Chandler models the windshield is adjustable for rain or clear vision, or ventilation. The

hard things about each other because of this and thereby losing much valuable time.

"We motorists have in the past looked down on the farmer as a pest, wishing him out of our roads and forgetting that he was a builder of roads as nearly suitable for his purpose as he could with his knowledge of road building; forgetting that he, if anyone, has had a proprietary right to the roads, as they are on his land and were built by him. The farmer has been equally a judge of us. He has felt that we were usurpers, tyrants and trespassers, not realizing that good roads are something that would eventually be a necessity for him, something that would bring him closer to his fellow

men, his market, his church and his school".

To show the burden of bad roads Mr. Gilbreath quoted statistics compiled by the civic and commercial associations in St. Paul and Minneapolis, Minn., these being the result of replies received from 4000 farmers. These statistics, according to Mr. Gilbreath, show a loss because of longer routes of \$61,994; loss because of slow progress, \$75,627; loss because of extra trips, \$296,228; loss because of specific reasons, \$221,374; loss because of inability to haul manure, \$91,925. This gives a total loss to the farmer of \$747,149, and for the same period the loss to the merchant is placed at \$910,000, giving a total loss of \$1,657,149 to both merchants and farmers as the direct result of bad roads. Mr. Gilbreath also gave an outline of the Dixie highway.



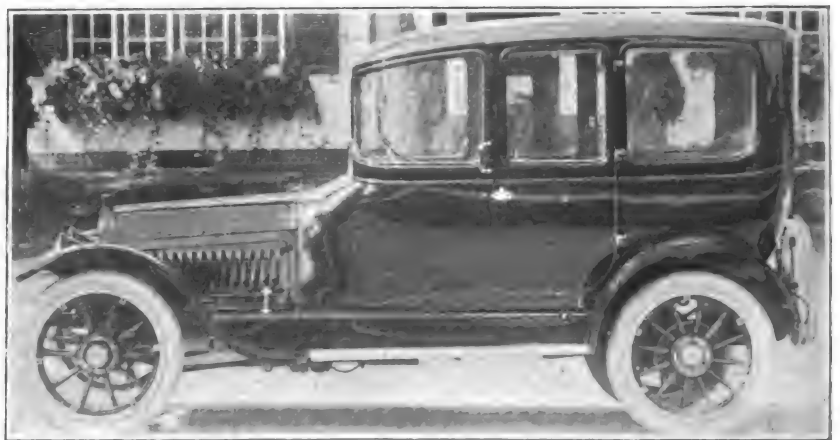
The Seven-Passenger Chandler Six Limousine, Which Is Exceptionally Light in Weight.

weight of the cabriolet is 2915 pounds.

Both limousine and coupe are upholstered in Bedford cord and lace of high-grade material, and have the usual equipment of curtains, interior electric lights and other conveniences. The five-passenger touring car and the two-passenger roadster are upholstered with a fine grade of leather and are completely equipped, including a one-man top, Jiffy curtains, electric horn, Jones speedometer, eight-day clock, carburetor adjustment on dash, etc.

GILBREATH TELLS OF GOOD ROADS.

At the recent meeting of the chamber of commerce, South Bend, Ind., William S. Gilbreath, secretary of the Hoosier Motor Club, Indianapolis, Ind., in a speech on the good roads problems, drove some excellent points home. Using "nothing retards civilization like inaccessibility" as the keynote, the Hoosier club secretary said that the condition of street or road traffic looks different to the pedestrian, to the man driving a horse, and to the man driving an automobile. "So it is with the road question", said Mr. Gilbreath. "We have confusion worse confounded because we are intolerant; because we are unwilling to put ourselves in the other fellow's place for a moment. We are saying



Chandler Five-Passenger Sedan, Which Weighs 3125 Pounds Fully Equipped.

TERMS OF THE NEW RUBBER AGREEMENT.

THE terms of the arrangement effected between the American rubber manufacturers and the British government under which the latter lifted the embargo on rubber from British possessions, have been made public in detail for the first time in a confidential communication sent out to the trade members of the Rubber Club of America, New York City, by the embargo committee. This confidential communication was made public by the German information service, which daily sends out pro-German material on the war to the American press. Later George B. Hodgman, president of the Rubber Club of America, verified the text of the report, which includes the results of the conference between the British officials in London and B. G. Work, president of the B. F. Goodrich Company, Akron, O.

"In general", the communication says, "it is understood the desire of Sir Francis Hopwood, who is in charge, that everything consistent with the protection of British interests shall be done for the convenience of American industry and as rapidly as the organization can be perfected for handling it. If any part of the plan proves too cumbersome after trial it is believed any reasonable relief can be obtained. Sir Francis Hopwood made it particularly clear to Mr. Work that the American industry could feel secure under the present plan, unless numerous violations occurred. Emphatic warning was given that in case any manufacture, importer or dealer came under suspicion his permits would be immediately revoked. Reinstatements will be slow and difficult. The British government will cancel first and investigate afterward".

The substance of the undertakings of the American manufacturers are given as follows: **First**—Manufacturers cannot export or sell to any one who might export crude rubber, waste rubber or reclaimed rubber except to Great Britain or a British possession. They may not sell plantation rubber even to any one in the United States. A manufacturer may, however, sell Brazilian rubber to a customer in the United States, but for his own protection should assure himself that no exportation is intended. All plantation rubber must be used in the factory of the manufacturer for whom it is imported.

Second—No direct shipments of partly manufactured goods may be made to a European neutral, like Sweden, Holland or Italy. Such orders

can be filled only through an agent in London. For example, an order for automobile tires for Sweden cannot be shipped direct. You must appoint an agent in London and he must get a permit from the British government to ship the goods from London to Sweden. This having been arranged, you can forward the goods to your London agent. It is recognized that this mode of shipment is difficult for those who have no London agent, and the embargo committee is endeavoring to secure the acceptance of a plan which will greatly simplify it. To such manufacturers as have no London agents the secretary is prepared to recommend firms of forwarding agents with both New York and London houses, who can attend to such business.

Third—Bear in mind that the British consul-general at New York has no authority to modify these rulings. If you attempt to make a shipment direct to Sweden and have the papers vised by the British consul you are still in violation of your obligation. Informing the consul that you are about to violate will not help you. His signature means only that he has been informed, not that your obligations have been modified by him.

Fourth—No goods must be sold for delivery to an enemy of Great Britain. This is plain enough. If through intent, carelessness or misfortune your goods are found in transit to Germany your permit will be cancelled. You must be sure. This does not mean, we are informed, that there must be an agreement not to export accompanying every tire you sell, but every reasonable precaution must be taken. You should have definite agreements from every customer who is likely to export, and we would suggest the use of a rubber stamp for all orders and invoices, stating that the goods are sold with the understanding that they are not to be exported except to Great Britain, France or Russia or to a European neutral by way of the United Kingdom or to a non-European neutral.

Fifth—All goods exported to a non-European neutral, like the South American countries, Mexico or Cuba, must be reported to the British consul at the port of shipment. We recommend that this report state only of what the shipment consists and the port of destination. We do not understand that it is necessary to state prices or even the name of the consignee.

COLE PREDICTS BIG TOURING YEAR.

PLANs for the greatest transcontinental tour in the history of motoring have been mapped out by J. J. Cole, president of the Cole



J. J. Cole, President of the Cole Motor Car Company, Indianapolis, Ind.

Motor Car Company, Indianapolis, Ind. Mr. Cole believes that 1915 will see hundreds of automobile owners traversing the United States to San Francisco and San Diego, and he is receiving the co-operation of the officials of both the expositions, and also the aid of the various

highway and good roads associations throughout the country.

Up to the present time, 20 Cole owners have signified their intention of making the transcontinental trip. Mr. Cole feels that the motor car has become the democratic conveyance of all the people and has ceased to be in any way a class equipage; that as such it promises to make the future activity in road building a thing to be regulated almost exclusively by the motor using people; and that it is high time for the average motorist to know exactly what is being done on the plan for transcontinental highways. "I believe", says Mr. Cole, "that the people themselves should have first-hand information about the roads they are to build and own. I do not believe that Congress or state legislatures should go ahead building whatever sort of roads they see fit, levying unexplained taxes, and cavorting generally with the road proposition, until the people themselves have a chance to pass on their purchases, or at least to form some kind of concrete notion as to what they need and ought to have.

"I have often thought that if ever there arose an occasion when the people had a real incentive to tour across the proposed routes of the big na-

tional highways, everyone in a position to help the movement should lend his encouragement. The coming California expositions give the very incentive the people have needed. Couple with this the fact that a great travelling factor will now be compelled to tour America who have heretofore spent much time abroad, and you have the making of a real touring year.

"The current year will be the greatest touring year the United States ever saw. It will result beneficially to the entire country. California will not reap all the benefit, as every state will come in for its share. The wholesale personal education relative to every state traversed will result in a distribution of wealth up to this time unknown. It will result in interstate investment, which could never come from merely looking out of car windows. Americans, as a rule, do not buy 'sight unseen', and once they have crossed the country in an open car they will see for themselves many waiting opportunities to invest profitably."

SAYS LAWS ARE NOT ENFORCED.

Job H. Lippincott, motor vehicle commissioner of New Jersey, has completed an investigation of the alleged non-enforcement of the

automobile laws of that state. According to Commissioner Lippincott the laws of that state are not enforced in a uniform manner, and to substantiate his statement the commissioner has prepared a map showing the distribution of money collected in fines for violation of the motor vehicle laws. The



Job H. Lippincott, Motor Vehicle Commissioner, New Jersey.

money collected has been distributed by counties as follows: Atlantic, \$5278; Bergen, \$1146; Burlington, \$7; Camden, \$2163;

Cape May, \$75; Cumberland, \$127; Essex, \$5337; Gloucester, \$34; Hudson, \$1341; Hunterdon, \$85; Mercer, \$1327; Middlesex, \$614; Monmouth, \$2757; Morris, \$735; Somerset, \$260; Sussex, \$23; Union, \$675, and Warren, \$338.

Regarding the variance of law enforcement, Commissioner Lippincott says: "It is the intention of this department to ask the co-operation of the local authorities, and if it is found that such co-operation cannot be obtained by the request from the commissioner of motor vehicles as provided in the motor vehicle act, it will then be the duty of the department to commence proceedings in which the prosecutor of the county will be asked to assist, for the purpose of demanding that the authorities in town and city provide for a uniform traffic regulation.

JOHNSTON AGAIN HEADS DEALERS.

R. H. Johnston of the White Company has been unanimously re-elected president of the Automobile Dealers' Association, New York City. Charles H. Larson of the Oldsmobile Company, re-elected vice president, and Charles M. Brown of the Winton Company, elected secretary and treasurer to succeed Frank Eveland, who resigned when his company retired from business.

At a meeting at the Hotel Woodward, the 50-foot rule of the New York fire department was discussed. This rule is that no garage shall



R. H. Johnston, Re-Elected President of the Automobile Dealers' Association.

be within 50 feet of a school, hospital, theatre or any place of meeting, and Mr. Johnston reported that he had conferred with the board of Hazardous Trades, claiming this rule to be a detriment to the automobile interests of the city, and asked that the order be rescinded. The subject of multiple inspection, now

being considered by the mayor's special committee, was also reported on. The association favors a consolidation of bureaus

DEVELOPMENT OF NEW COLE EIGHT.

Charles S. Crawford, chief engineer of the Cole Motor Car Company, Indianapolis, Ind., who was for three consecutive months at the Northway

plant, at Detroit, Mich., assisting in the construction and completion of the eight-cylinder motor used in a new Cole model, says of the Cole engine: "Inasmuch as the general public has shown a decided interest in the development of the eight-cylinder motor, we



C. S. Crawford, Chief Engineer of the Cole Motor Car Company.

feel that the time is opportune for letting it know some of the facts of this late commercial product.

"From actual experiment it has been proven so far as we are concerned that we have had less development and experimental work to do on our eight-cylinder motor to make it a practical commercial success from the layman's viewpoint, than we experienced on either fours or sixes of past and new design. The carburetion of an eight-cylinder depends largely upon the design of the manifold, and its relation to the general construction of the motor. The scissor type connection rod of the Cole eight permits of maximum bearing surface, which is far in excess of the bearing surface in positively successful sixes and fours of equal piston displacement.

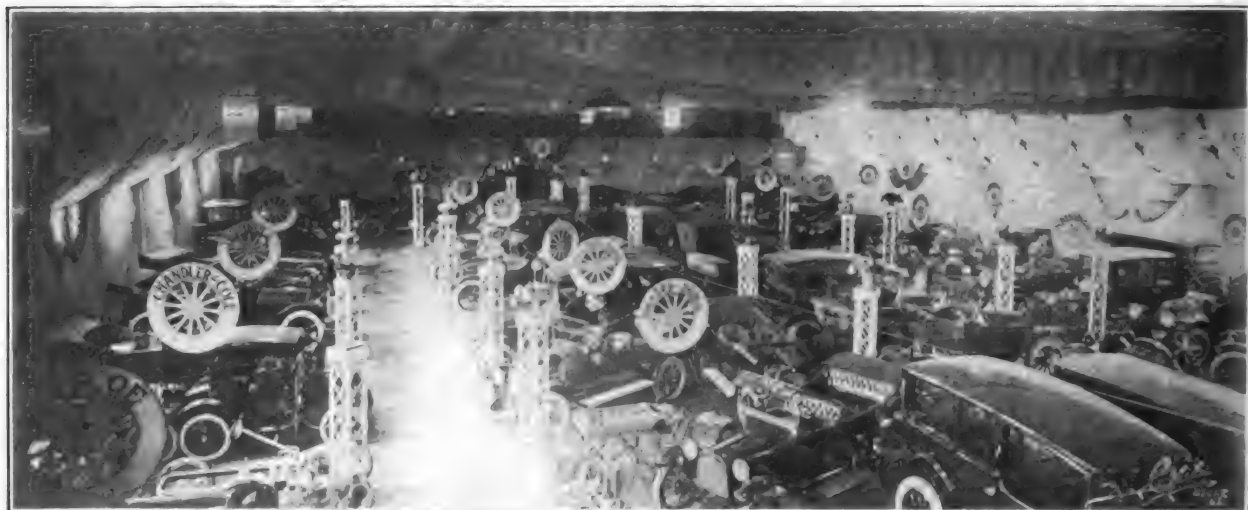
"The extreme simplicity of the oiling system in the Cole eight-cylinder motor makes it permanently positive and efficient. The continuous flow of power in the eight makes it possible to generate vastly more horsepower with greatly reduced weight, which from an engineering standpoint means that the eight is headed in the right direction. The increase in the flow of torque also produces a considerable saving in fuel over past designs of equal piston displacement. The eight practically eliminates gear shifting and any practical motorist knows that gear shifting eats up fuel.

BRIDGEPORT SHOW A PRONOUNCED SUCCESS.

THE fifth annual automobile show at Bridgeport, Conn., which took place in the state armory in that city from Feb. 15 to 20, was the

four cars being shown. Incidentally, the Ford agent made the first sale of the show.

One of the special features was the exhibit of



General View of the Bridgeport, Conn., Automobile Show, Held at State Armory in That City, Feb. 15-20 Inclusive.

most successful event of the kind from the viewpoint of attendance, number of exhibits and sales. The show was extremely well organized and attracted largely from that section of the state. It was opened by Mayor Wilson, the inauguration being witnessed by several thousand persons.

The exhibits included 63 automobiles, eight motorcycles, five bicycles and numerous displays of accessories and equipment, the leading manufacturers in all branches of the industry being well represented. The Blue Ribbon Company,

electric cars by the Detroit Electric Company of Connecticut. The cars shown were those that were exhibited at the Hartford show.

TROY HAS BANNER EVENT.

The recent automobile show held at Troy, N. Y., was one of the most successful exhibitions ever held in that part of New York state, from the standpoint of interest displayed, attendance, sales and number of exhibitors. The dealers who exhibited at the show stated that sales were far



View of the Pleasure Car Exhibit at the Recent Troy, N. Y., Automobile Show.

Bridgeport, Conn., exhibited two Packards, two Dodge roadsters and one Dodge touring car. The Ford exhibit was one of the largest in the show,

in excess of all predictions made prior to the opening of the show, this statement applying alike to automobiles and accessories.

DORT ANNOUNCES TWO NEW MODELS.

THE Dort Motor Car Company, Flint, Mich., is now building two low-priced Dort cars. One of these is a five-passenger touring car and

the other a two-passenger roadster, both of the four-cylinder type. The former sells for under \$700 and the latter under \$500. The Dort Motor Car Company is a \$500,000 corporation organized by the stockholders of the Durant-Dort Carriage Company. The new Dort car, it is said, is the product of 28 years of manu-

facturing experience. engineers say, entirely eliminates back pressure. Lubrication is by a combination splash and pump system. The crankshaft is heavy and is carried on large bearings. The crank case is cast of aluminum. The Dort transmission gearset is a three-speed, selective type, with nickel steel gears and shafts. It is bolted to the rear of the motor, forming with the motor and clutch a unit power plant. The power is transmitted from the motor to the transmission gearset by a leather-faced cone clutch, equipped with six adjustable, compensating springs, and from the gearset to the rear axle by a single Spicer universal joint and a nickel steel propeller shaft of large dimensions. The rear axle is a semi-floating type, and the shafts, differential gears and pinions are all nickel steel.

The Dort bodies are well designed and are excellent examples of streamline effect. Plenty of leg room in the driving compartment is provided in both the touring and roadster models. Deep upholstered cushions add to the comfort.

John D. Mansfield, general sales manager of the Dort Company, says that it is the aim of the concern to produce thoroughly good, substantial cars at reasonable prices. "We have built a car that is low enough in price as to be within reach of every one", says Mr. Mansfield, "yet we have not built them at a price so low that we cheapen the quality of the materials used in their construction. For example, every ounce of power developed by the motor is transmitted to the rear wheels through gears and shafts of nickel steel.

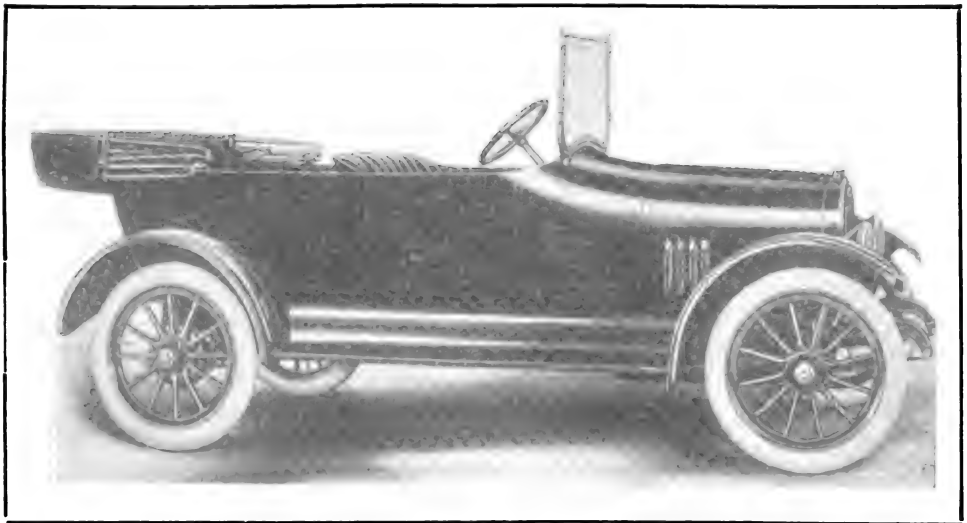


John D. Mansfield, General Sales Manager, Dort Motor Car Company.

experience.

In both touring and roadster models the motors are similar in design and construction. The touring car motor has a cylinder bore of $3\frac{1}{4}$ inches and a stroke of five, and the roadster has a cylinder bore of three inches and a stroke of four. The cylinders in both instances are cast en bloc, with detachable heads. Cooling is by a thermo-syphon system of water circulation. The water jackets are stated to be extremely large. Each cylinder barrel is independent from the others, and the water circulates completely around it. The valve cages are also cooled uniformly.

A feature that is distinctive in the Dort motor is the double exhaust manifold, which the company's



The Dort, Five-Passenger Touring Car, One of the Latest Low-Priced Machines.

OIL PRODUCTION BREAKS ALL RECORDS.

ALL records for oil production in this country were broken during 1914, and a total of 292,000,000 barrels were produced. This is according to John D. Northrop of the United States geological survey, and it is pointed out by the government that California was again the largest producer, having contributed a total of 103,000,000 barrels. Mr. Northrop shows by his charts that the phenomenal increase which has characterized the growth of the petroleum industry in the United States during the last eight

years was more than maintained during the past year.

The preliminary figures indicate an increase of more than 13 per cent. over the production of 1913, which reached the record breaking total of 248,446,230 barrels. The enormous output in 1914 may be attributed to the remarkable success that attended the great increase in field activities stimulated by the high

principal factors contributing to the production in 1914".

In the following table an estimate of the oil production in 1914, as made by the United States geological survey, and the actual production of 1913, in barrels, are given:

State	1914	1913
California	103,000,000	97,788,525
Oklahoma	98,000,000	63,579,384
Illinois	21,000,000	23,893,899
Texas	20,000,000	15,009,478
Louisiana	15,000,000	12,498,828
West Virginia	11,000,000	11,567,299
Ohio	7,500,000	8,781,468
Pennsylvania	7,000,000	7,963,282
Wyoming	4,600,000	2,406,522
Kansas	2,700,000	2,375,029
Indiana	700,000	956,095
New York	800,000	902,211
Kentucky	500,000	524,568
Colorado	150,000	188,799
Other states	50,000	10,843
Total	292,000,000	248,446,230



In 1914 the Oil Production in the United States Exceeded 1913 by 43,553,770 Barrels.

prevailed in 1913 as well as in the early months of 1914.

"The spectacular results of deeper drilling in mid-continent and gulf regions; the development of a number of prolific pools in Oklahoma, northern Texas and northwestern Louisiana, in areas little tested at the end of 1913", says Mr. Northrop, "the successful extension of many proved districts in the Appalachian and mid-continent region; the discovery of new productive fields and the increased development of the old fields in Wyoming, and the large number of gushers completed in California comprise in brief the

It is stated that the rapid downward trend of the petroleum market in April and succeeding months, due to over-production in the mid-continent region, supplemented by the temporary decrease in exports following the declaration of war in Europe, resulted in the curtailment of operations in all districts, the shutting in of wells wherever practicable, and the confining of new work for the most part to shallow sand areas. Toward the end of the year the firmer tendency of the market resulted in a slight increase in field activity.

As in the previous year, the greatest development in 1914 centred in the California sunset-midway region, where a number of large flowing wells were completed, for the most part in the Buena Vista hills and Maricopa Flat areas. The most spectacular of these wells was that of the Lakeview No. 2 Oil Company, in Maricopa Flat, which ran wild from May 10 to Oct. 25, the estimated daily flow reaching at times as much as 50,000 barrels. At first the well produced practically pure oil, but water eventually broke in, and during the last few weeks the production was over 60 per cent. emulsion. In the north end of the Midway field relatively shallow wells penetrated unusually thick oil sands and during the year this section of the field was closely drilled. In the southern fields the drilling of deep wells continued in the Coyote hills, south of Los Angeles, and a number of flowing wells were completed. The Shell Company, which entered California late in 1913, completed a tank farm in the

North Midway field and commenced work on a pipe line between Coalinga and San Francisco bay.

Oklahoma's Spectacular Year.

Oklahoma furnished the most spectacular as well as the most demoralizing feature of the year in review. At Cushing the development of the deeper lying prolific Bartlesville sand and the rapid extension of productive limits, particularly to the northeast, increased the daily output of the field from 23,000 barrels the first week in January to more than 225,000 barrels in the latter part of December. The figures of actual above ground production, though forming the basis for the estimate of Cushing's contribution to the state's net yield, fail to represent the true capacity of the field, as the flow in many of the wells is reduced to a minimum or completely shut in. In Carter county, southern Oklahoma, the development of the Healdton pool, though overshadowed by Cushing, was sensational. Early in January the estimated daily production from seven wells was considerably less than 1000 barrels, but late in December the estimated production of the field, with many wells shut in, was more than 35,000 barrels a day.

Output of the Appalachian Region.

In New York development work was confined to proved areas. Considerable activity was noted during the latter part of the year in the Scio field, a shallow sand area in Allegany county. In Pennsylvania the greatest activity was in the southwestern district, including Allegheny, Beaver, Butler, Washington and Greene counties, where the best producers of the year were found, and where slight extensions of productive areas were made. In the Venango-Clarion and McKean-Warren fields nominal activity prevailed in defined areas.

FOREIGN PETROLEUM INDUSTRY.

Although the world-wide search for petroleum which characterized 1913 continued unabated during the early part of 1914, the latter part of the year disclosed a notable falling off both in development work in proved areas and in exploration. This decline, as stated by J. D. Northrop of the United States geological survey, is accounted for by the demoralizing effect of the European conflict on petroleum markets and securities, coupled with an enormous over-production in the United States and Mexico.

In Canada the decrease in production from the declining fields of Ontario and New Brunswick was not offset by the results of extensive

wildcatting, which centred in Alberta, where small amounts of petroleum were found in wells in the territory adjacent to Calgary, but which was also prosecuted with considerable zeal in southeastern and southwestern British Columbia and southern Saskatchewan.

Mexican developments centred in the northern fields at Topila and Panuco, to which substantial additions of productive area were made during the year. Work in the southern fields suffered considerable interruption, owing to the activities of the warring factions in Mexico, and work in all districts was abruptly curtailed and in many places terminated by the exodus of work-

men and operators that began in April. Toward the end of the year the oil fields showed increased activity, owing in part to the resumption of the use of oil



Using 50 Gallons as an Average for Each Barrel, the Above Gives the Oil Production in the United States for 1913 and 1914.

by Mexican railroads and industries, though the lack of storage facilities and the unstable condition of the government precluded more than nominal operations. Promising discoveries of oil on Rancho El Chapopote indicate the possible eventual development of an old field near Campeche, State of Campeche.

Discoveries in South America.

In South America oil and gas were discovered at Tubara, Colombia, adjacent to the Caribbean sea and not far from the Panama canal. In Argentina the government development continued in the Comodora Rivadavia areas, and legislation providing for the leasing of the state reserve in that field was considered.

GOODYEARS STAND UNUSUAL STRAIN.

H. M. McDermid of Indianapolis, Ind., who drove the Empire Pathfinder car that blazed the way for the Chicago-to-Florida highway, wrote recently on his experiences with the Goodyear tires with which his car was equipped. These tires, made by the Goodyear Tire and Rubber Company, Akron, O., stood the unusual strain from start to finish. Regarding their performance, Mr. McDermid says: "You notice I never had a puncture on my Goodyear tires nor made an adjustment to the car on the entire trip. That is absolutely true. The tires are the regular equipment we use on all Empire cars, and were taken from stock in the usual way. I showed them to Mr. Ramm, who runs this garage, and he was astonished at their condition. Not one shows wear, and the all-weather studs on the rear are not even worn down smooth at the corners.

"I waded through several hundred miles of Tennessee and Georgia clay mud, climbed the Cumberland mountains, crossed the deep sands of Florida and pulled off other stunts that would have torn inferior tires to pieces". The trip was conducted under the auspices of the Hoosier Motor Club, Indianapolis, Ind.

RAILROAD EARNINGS FROM AUTOS.

The shipment of automobiles from factories of this country in 1914 totalled 138,250 carloads, each car containing from two to six complete automobiles, and in some cases more when the machines were shipped "knocked down". This, according to the National Automobile Chamber of Commerce, was about 14 per cent. greater than the number of cars required for shipping automobiles in 1913. Automobile freightage is one of the most important items of traffic in high-grade manufactures handled by the railroads, the earnings from these shipments being estimated at upwards of \$15,000,000 annually.

NEW LIGHTING FOR PIERCE-ARROW.

The Pierce-Arrow Motor Car Company, Buffalo, N. Y., announces that the interior lighting of all Pierce-Arrow enclosed cars is accomplished by an entirely new and novel method, for automobiles. The new system is that of semi-indirect illumination, and the fixture is of exclusive Pierce-Arrow design and manufacture. The fixture itself is silver and glass, with an ivory enamelled reflector. The glass globe used is just large

enough to accommodate three, four-candlepower bulbs. The frosted globe partially reflects the light rays upon the main reflector above it, which is so shaped that a soft, agreeable radiance is diffused throughout the car, obviating all the glare of direct, unfrosted globes. This, it is said, gives more light than the entirely frosted globes, which have hitherto been the only type available.

JEFFERY PRODUCTION HALF SOLD.

E. S. Jordan, sales manager of the Thomas B. Jeffery Company, Kenosha, Wis., reports that 50 per cent. of the 1915 Jeffery production has been sold and delivered. In commenting of the large sales made by his company during the winter months, Mr. Jordan says: "All through the year we have experienced a normal, healthy demand for Jeffery cars, which has at no time fallen below the mark, which we consider to be highly favorable and indicative of prosperity. Our larger models are practically all subject to orders now and from the present indication the Chesterfield six and the light four will also be sold out at least a month before the time we normally set as the end of our spring selling campaign".

HARRISBURG TO HAVE AUTO SHOW.

At a recent meeting of the Capital City Motor Dealers' Association, Harrisburg, Penn., at the Hotel Plaza, that city, the following officers were elected: George Dechant of the J. I. Case Threshing Machine Company, president; E. W. Shank, Maxwell representative, vice president, and R. C. Barrett of the East End Auto Company, secretary and treasurer. In addition to the above, the following executive committee was elected: E. L. Leinbach, City Auto Supply Company; P. D. Driscoll, Ford; David Ream, Mitchell; E. C. Ensminger, Hupmobile and Lewis, and W. H. Nicolai, representative for Hottenstein and Zeck.

The executives decided to hold an automobile show in Harrisburg March 13-20, at the Kelker street hall.

CANADA TO TURN OUT 36,000 AUTOS.

For the current calendar year the Dominion of Canada will manufacture 36,000 automobiles. Of this total the Ford Motor Company of Canada, Ltd., Ford, Ont., will contribute 30,000, which is 12,000 more than this company turned out during 1914.

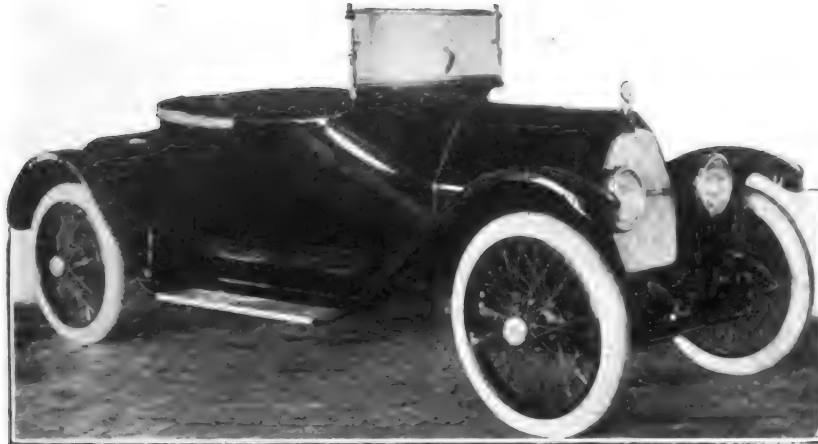
LEWIS VI HAS MANY NEW FEATURES.

WITH a full torpedo body, streamline in effect, a distinctive hood and radiator, and simplicity throughout, the Lewis VI for 1915 is

The crank case is closed by a flat, easily removed aluminum bottom plate, which does not hold or support the crankshaft. The crankshaft has three main bearings, all $2\frac{1}{4}$ inches in diameter, with $2\frac{3}{4}$ inches length at the front and centre and three inches length at the flywheel end. The flywheel is bolted to a flange forked integral with the crankshaft. The I section connecting rods are high quality material, and the weight of the reciprocating parts is kept to a minimum. The connecting rod caps are each held in place by two chrome nickel steel bolts, and the big end bearings, which are faced with Parson's white brass, are $2\frac{1}{4}$ inches in diameter and two inches length. The piston

pin bearings, $\frac{5}{8}$ -inch diameter, are a type in which hardened solid pins are clamped in the connecting rod ends and rock in the piston bosses.

The valve and valve-actuating mechanism are of unusual and interesting construction. The valves are operated by a single camshaft. The valves themselves, of $\frac{7}{16}$ -inch lift, are $1\frac{13}{16}$ inches in diameter. Instead of push rods, small rocker members are assembled into the cylinder walls from the outside, where they are held in pairs



The Lewis VI Roadster, with Disappearing Top, Which Has Space for Three Suitcases Behind the Seat.

a distinctive car. This machine, made by the L. P. C. Motor Company, Racine, Wis., is finished in a deep Brewster green, the frame, fenders and hood being enamelled black.

Though a new car, the Lewis machine represents the full development of the motor car industry, for upon its production has been concentrated the endeavors of well organized engineering and the knowledge and experience of M. Petard, an engineer, and William Mitchell Lewis, J. M. Cram and J. W. Gilson, four extremely well known men.

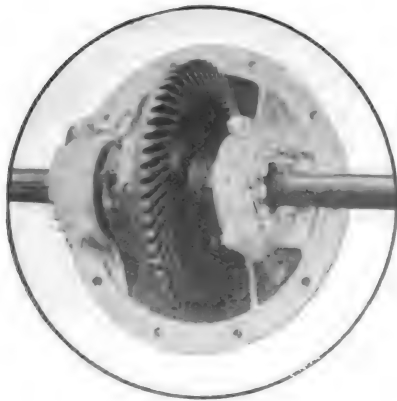
Cast en bloc, the six-cylinder, L head, water cooled motor, with bore of $3\frac{1}{2}$ inches and stroke of six, has a horsepower rating of 29.40 by S. A. E. formula, but the company's engineers state that repeated trials establish production in excess of 60 horsepower with brake tests. The main cylinder casting, the crank case and the flywheel housing are molded in one piece, and the cylinders are all closed by a single cored top, cast with water spaces that match with openings into the cylinder casting. This is so designed that its removal affords access to all the exhaust and inlet valves, as well as to the pistons.



A Three-Quarter Rear View of the 1915 Lewis VI Sedan Model.

by a yoke construction, by which a single stud and yoke at once aligns and holds in place the whole actuating mechanism for two adjacent

valves. In the rocker members are mounted the hardened cam rollers, while on their ends, under the valve stems, are hinged adjustable valve lifters, each con-

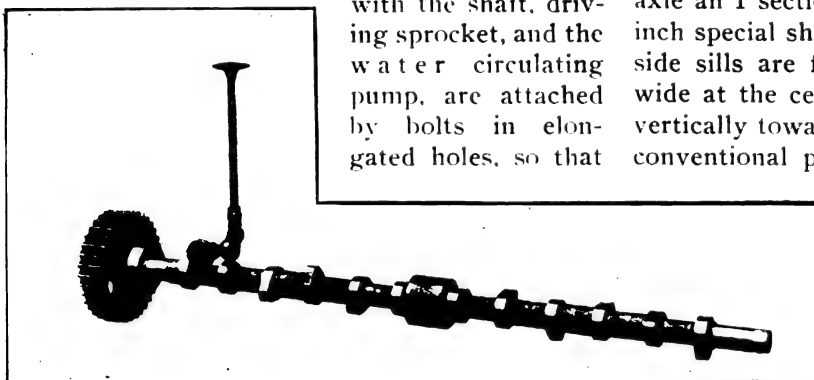


Skew-Bevel Final Drive Gears of Lewis VI.

stituted of an eyebolt with hardened cap and check nuts, the former engaging directly with the valve stem. The camshaft has three bearings, and the bearings and cams are all integral, hardened and ground to true contours and straight faces in special profile grinders. The two rear bearings are each one inch in diameter by two inches long, and the front bearing is of the annular ball type.

There being but the single camshaft, and this elevated considerably above the crankshaft, the distribution gearing is reduced to a single over-size, silent chain, completely enclosed at the front of the motor, that passes around the crankshaft, camshaft and an idler gear, the three of which are in a triangle. This construction, the company's engineers claim, obviates lash from wear and the idler is employed as the cranking element of the electrical starting mechanism.

The Remy electric starting motor is so arranged that it constitutes an inbuilt part of the power plant. It is mounted on a bracket integral with the right side of the motor casting, and this,

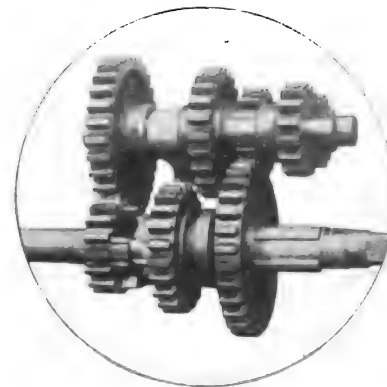


The Camshaft and Valve Mechanism of the Lewis VI.

the entire assembly can be moved slightly to the right, affording adjustment to the silent chain, by which it and the camshaft

are driven. The ignition is by battery, and a distributor takes the current from the same battery that serves the lighting and starting systems.

An automatic float feed type carburetor and a vacuum system of fuel feed are employed. The intake manifold passages are completely and invisibly cored into the cylinder block, so that the ingoing fuel is well warmed and fully gasified by the hot water jacket. The exhaust manifold is constituted of a U section casting bolted to the side of the cylinder head casting, the joint being accurately faced and tightly gasketed. Longitudinal cooling fins, or ribs, on its exterior surface promote radiation of the manifold. The centrifugal pump used in circulating the water in the cooling system is accessibly mounted and is driven from the same shaft that serves the electric generator and starter. The water is cooled by a large cellular radiator. The lubrication is



The Lewis VI Gearset.

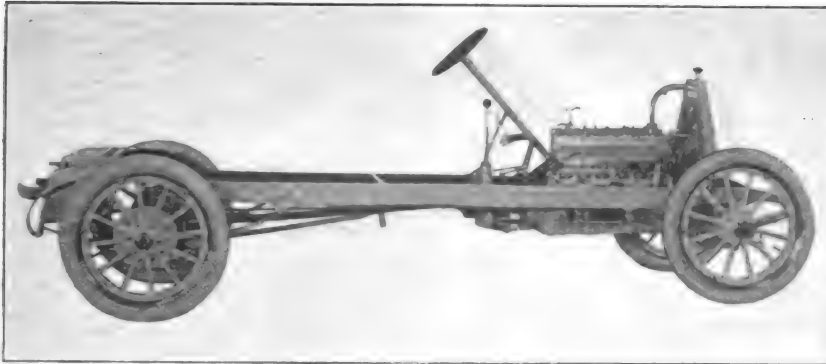
maintained by a small plunger pump driven from the camshaft. A multiple disc type of clutch is used, consisting of 11 large diameter disks of steel faced with Raybestos. The clutch springs are six in number, and so arranged that there is no end thrust on either crankshaft or gearshaft. The rear axle is a full floating type, and the front axle an I section. The frame of the car is 5/32-inch special sheet stock, chosen for stiffness. The side sills are five inches deep and three inches wide at the centre, and taper both laterally and vertically towards both ends. Another step from conventional practise is in the braking system.

the foot pedal operating the service brake shoes within rear wheel drums of pressed steel, 16 inches in diameter and two inches wide. The emergency brake operates on a small drum on the main driving shaft, back of the gear box, by hand lever.

The body of the Lewis VI is an excellent example of coach work. All door hinges and handles are concealed, and the whole outline is developed

from a careful study of the forms that can be easily worked. Crowned fenders are used, and the running boards are free. The equipment of

The proportion of the Willys-Overland Company's production of this enormous total is indicated by the fact that during a recent two weeks' period this concern did more than \$3,000,000 worth of business, and the value of the shipments was almost \$300,000 a day.



Side View of the Stripped Chassis of the 1915 Lewis VI Model.

the Lewis VI is complete in every detail, and the instrument board is admirably arranged. The two-passenger roadster model has a disappearing top, and there is space for three suitcases behind the seat. In addition to the roadster is a standard touring car and a pleasing sedan model.

NEW HOME FOR FEDERAL RUBBER.

Largely increased business in the northwest has caused the Federal Rubber Manufacturing Company, Milwaukee, Wis., to plan a magnificent Minneapolis branch. The new building will be located at 1117 Hennepin avenue, and will be the clearing house for a great volume of business handled in that territory. The new structure will be two stories in height, with full basement. H. F. Bigelow, well known in the tire trade, is Minneapolis manager for the Federal Company.

FIRESTONE TO ENLARGE PLANT.

The Firestone Tire and Rubber Company, Akron, O., is to make extensive additions to its plant, and work on these is to be begun immediately. Statement is made that these extensions are necessary as the result of the increased tire sales since the recent reduction in prices. The Firestone Company has been running its plant to capacity throughout the winter months.

WILLYS-OVERLAND'S BIG BUSINESS.

John N. Willys, president of the Willys-Overland Company, Toledo, O., estimates that 500,000 automobiles will be produced in the United States this year, valued at approximately \$500,000,000.

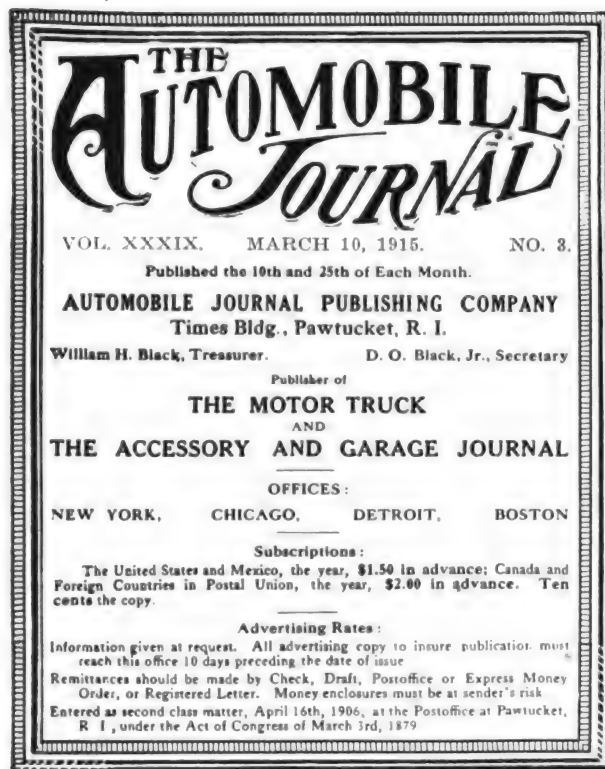
ments made during the week and the unfilled orders on hand were even greater than at the end of any previous week. Monday, Feb. 15, was the biggest day in the history of the company, when 300 cars, valued at \$296,725, were shipped without any accumulation from the preceding day. This was 50 per cent. larger than the shipments for the corresponding date of last year. The cars went to 26 different states, to 65 cities, and 18 were shipped abroad to Overland foreign dealers. The entire day's shipment required 91 freight cars.

Since that date the company has maintained a shipping average of 270 cars a day, which is a record production for medium priced cars. Work has begun on two new factories, and when completed the larger building will be 1000 feet long, 200 feet wide, with two stories and basement. The second building will be 200 feet



John N. Willys, President of the Willys-Overland Company, Toledo, O.

square. Together the structures will contain 17 acres of floor space, giving the company over 100 acres of floor space.



RESULTS OF BOSTON SHOW.

The results from the Boston automobile show, as reflected by the statements of the exhibitors, will be extremely large and satisfying, because in these must be included a considerable proportion of the business that many of the selling branches will do during the coming spring. The Boston exhibitions have always been national in scope and importance, although organized by a local association, and for years this show has been more productive than either the New York or Chicago displays.

In New England, and the Boston show ought to be regarded as being the market place of that section of the country, with a population of about 7,000,000, more than a tenth of all the machines in the United States are owned, and the ratio of automobiles and trucks to the number of inhabitants is the largest in the world when any given territory is considered.

The motorists of these states have had more experience than those of other parts of the country, they have developed the use of trucks and wagons to far greater extents, and they buy machines with keen knowledge of mechanical design and construction. The demand is not for

cheap automobiles so much as for what will afford the largest measure of utility, economy or luxury, for these are the material factors that influence buying, either singly or collectively, and the manufacturer can very well determine from the attitude of Boston show buyers whether or not his production will meet with approval elsewhere in the country.

The large interest of the public in eight-cylinder and six-cylinder machines is indicative that there will be a considerable demand for these types—that is, the eights will be purchased, not as novelties, but as thoroughly practical vehicles that have specific qualities that recommend them, and the sixes because they are regarded in the same light as compared with four-cylinder types.

The combination of the exhibition of pleasure cars and trucks and wagons was extremely satisfactory. The power wagon department was extremely large and it contained a number of makes that were seen for the first time, as well as being the initial display of production just placed in the market. The commercial vehicles were quite as attractive as the pleasure cars to many thousands.

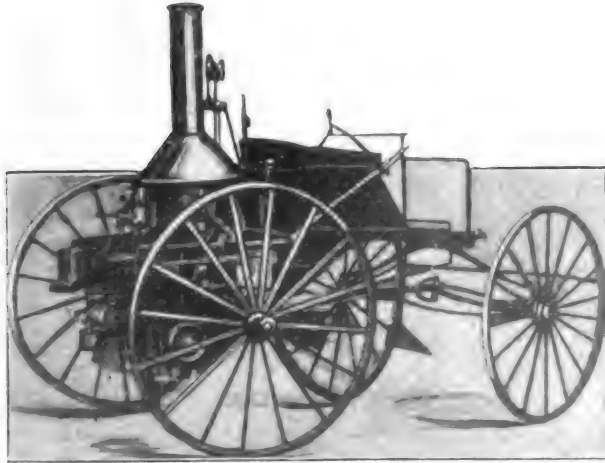
The truck and wagon exhibitors have established many agencies and have strengthened their organizations by active selling representatives, as results of the show, and with numerous retail sales and agency contracts they are, as a whole, well pleased. The show presages a business in New England that will exceed that of any previous year, both in number of sales and value.

OPTIMISM AT THE FACTORIES.

The optimism that is reflected from the different factories of the automobile industry is well worthy of consideration. This confidence is very general and is more than ordinarily well founded, for it is based on first hand reports from capable representatives and on the actual orders received from the sales organizations. The demands of the agencies and branches have been consistently increased, and as initial orders were conservative, continuous buying has been impelled by actual sales of whatever stock might be available. Many of the manufacturers have been compelled to increase their working forces to keep pace with the purchasing.

EVIDENCE ON BEGINNING OF AUTO INDUSTRY.

WHAT is said to be indisputable evidence that the beginning of the automobile industry took place in Wisconsin by legislative act



Dr. Carhart's "Steam Buggy", Built in 1871, at J. I. Case T. M. Company's Plant.

in 1875 was recently discovered while transferring state documents in the office of the secretary of state. It was a legislative act offering a reward of \$10,000 "to be used as a bounty, and to be paid to any citizen of Wisconsin, who shall invent, and after five years' continued trial and use, shall produce a machine propelled by steam or other motive agent, which shall be a cheap and practical substitute for the use of horses and other animals on the highway and farm".

In a letter to the J. I. Case Threshing Machine Company, Racine, Wis., the secretary of state of Wisconsin, J. S. Donald, writes: "It seems that this action was taken as a result of a very early and apparently successful application of power to a road vehicle by Dr. J. M. Carhart, whose 'steam buggy', as it was known, was built in 1871 at Racine * * * in your factory and with the co-operation of your men".

Three more legislative acts intended to encourage the inventors of motor vehicles were passed, in 1876, 1877 and 1879. It is said that by the close of 1878 there were seven self-propelled motor vehicles before the public. The original "Steam Buggy" is not now in existence, but an authentic photograph of it, reproduction of which appears herewith, is in the archives of the State Historical Society, Madison, Wis.

In the Smithsonian Institution, Washington, D. C., is the original model Oldsmobile, built in

Lansing, Mich., in 1894, which has been commonly regarded as the grandsire of the motor car industry. Construction plans are said to have been laid as early as 1885, the propulsion to be by steam, but did not materialize until 1894, and then had a gasoline motor.

In the present working force of the Olds Motor Works, Lansing, Mich., are some men who worked upon the original Oldsmobile, and now engaged in building those Olds machines which are the outgrowth of the crude original. The latter presents the appearance of a strange combination of a horse drawn and power driven vehicle, as will be seen in the illustration on this page. So closely does it resemble the former that, were it not for the absence of whipsocket and shafts, it might easily be mistaken for one of the old style trap carriages of some 20 years ago. Even the dash board of the horse drawn vehicle was retained, while the 36-inch wooden wheels are distinguished only by the solid rubber tires. A jointed hand lever, somewhat similar to the early types of motor steering levers, forms the steering apparatus. A crank at the driver's right controls the gear shift and clutch release. The motor is a one-cylinder gasoline engine which incorporates several parts that are almost identical with the stationary engine of that day. A gasoline tank of 10 gallons capacity is located under the rear seat.

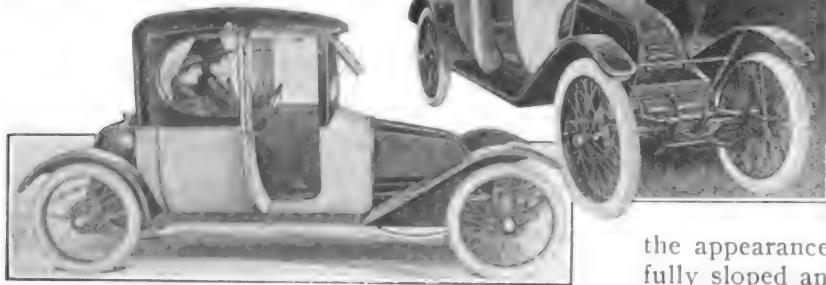


Historic Oldsmobile, Built in 1894. Now in Smithsonian Institution.

GOVERNMENT'S GASOLINE DISCOVERY.

Two discoveries, both of vast importance to American industries, and one regarded also as a priceless military asset, were recently announced by Secretary Lane of the Interior Department. They are chemical processes, developed after years of research by Dr. Walter E. Rittman, chemical engineer of the bureau of mines. According to the government's statement one of these discoveries is expected to enable oil refiners to increase their output of gasoline by 200 per cent., and the other makes possible the production from crude petroleum of toluol and benzol, bases for dyes and high explosives, for which in the past the United States and the rest of the world has depended almost exclusively upon Germany.

Dr. Rittman has applied for patents upon his processes, to prevent the possibility of any monopoly, and will dedicate them to the American people. "These processes", said Secretary Lane, "are fraught with utmost importance. The Standard Oil Company has had a big ad-



Two Views of the New Eagle-Macomber Limousine, Which Is Now Being Offered by the Chicago Concern—This Car Has a Rotary Motor.

vantage over independents in production of gasoline, having a patented process obtaining three times the amount of gasoline from a given quantity of petroleum which the independents now obtain. Independent producers as a whole have never been able even to approach these results. Now the federal government, through efforts of Dr. Rittman, proposes to make free for the use of all a process confidently expected to increase their yields of gasoline fully 200 per cent., and perhaps more. Dr. Rittman claims his process is safer, simpler and more economical. These are economic factors of great importance.

"I am led to believe it will not only be of estimable value to refiners of limited output as well as those of wealth, but also to the hundreds of thousands of users of gasoline. When it is realized the gasoline industry, which has yielded

\$100,000,000 to \$150,000,000, the importance of this discovery is seen".

MERCER MEN FORM TRENTON CLUB.

The foremen and members of the office force of the Mercer Automobile Company, Trenton, N. J., have formed the Mercer Automobile Club in that city. It is intended as a social affair and will afford the men an opportunity of getting better acquainted.

LIMOUSINE FOR EAGLE-MACOMBER.

The accompanying illustrations are from the first pictures of the new limousine bodies made by the Eagle-Macomber Motor Car Company, Chicago, Ill. These are installed on standard Eagle-Macomber chassis, and make rich appearing cars. The Eagle-Macomber car, described fully in a recent issue, is equipped with the Macomber five-cylinder, 14 horsepower, rotary motor. According to the company's engineers this motor will drive the cars from 40 to 50 miles on a gallon of gasoline, and is economical in every respect.

The new limousine body is finished in black and gray and an attractive electric side light arrangement adds materially to the appearance of the car. The hood is gracefully sloped and with wire wheel equipment the car is sightly from every aspect.

The Thermoid Rubber Company, Trenton, N. J., has opened an office and service department in Detroit, Mich., for handling the business of Thermoid brake lining, radiator hose, bumpers, clutch facings and discs.

The S & M Rubber Company, Coshocton, O., has been reorganized under the name of the McChirg Rubber Company, with a capital stock of \$250,000. J. S. McChirg, formerly of Akron, O., is at the head of the new concern.

Harris County, Tex., in which Houston is the principal city, has barred motor trucks from its unpaved roads.

M. V. Barbour has been elected president of the Ohio Electric Car Company, Toledo, O.

IN THE COMMERCIAL CAR FIELD.

American Truck Manufacturers Developing Notable Features in Transmission Systems—Packard, Fremont-Mais and Mack Systems.

NOTABLE developments in motor trucks and in power transmission systems have been announced by several manufacturers. The Packard Motor Car Company, Detroit, Mich., has increased its series of trucks, this now including six having from one-ton to six-ton freight capacities. The International Motor Company, New York City, has produced two new types of Mack trucks, these being at 2000 and 4000 capacities. The Lauth-Juergens Motor Car Company, Fremont, O., manufacturer of the Fremont-Mais trucks, is building two models, O and P, with 3000 and 5000 pounds capacities, respectively.

These new designs utilize power transmission systems that make for protection, thorough lubrication, strength and accessibility to work-

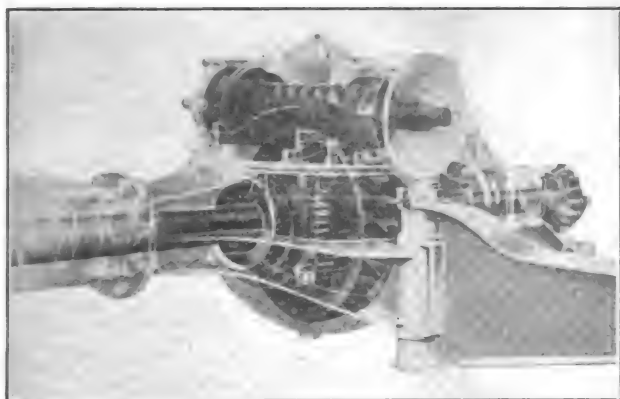
ries of six trucks of distinctive features. These machines have load capacities of 2000, 4000, 6000, 8000, 10,000 and 12,000 pounds, and are all of the worm drive type. They are equipped with three-point suspended power plants, and the drive is by worm and gear through a full floating rear axle. Electric starting and lighting systems can be installed when desired. The control has been centralized, the steering wheel and the speed ratio changing and emergency brake levers have been located at the left side.

The company states that these trucks contain the best features determined after 10 years' experience in building heavy duty trucks for usage in 185 different lines of industry. A new feature of the series is the one-ton truck which goes with the others to make up a very complete line for almost any commercial service. Heretofore the 4000-pound truck has been the Packard minimum.

Newly designed motors have been provided, they being four-cylinder, of the L head type, water cooled, with the cylinders cast en bloc. The one and two-ton freight capacity truck motors have bores of four inches, strokes of $5\frac{1}{2}$ inches, with 25.6 horsepower at S. A. E. rating. Three and four-ton truck motors have bores of $4\frac{1}{2}$ inches and strokes of $5\frac{1}{2}$ inches, with 32.4 horsepower rating. The power plants are suspended from three points. The motor unit can be removed without hoisting by removing the radiator, the front cross member and by disconnecting the water and other connections.

The timing gears are housed in a forward extension of the crank case, which has a removable cover. The upper section of the crank case contains the main bearings; the rear end of the lower section extends to form the lower half of the bell housing that encloses the flywheel. By removing a section of the bell housing access is had to the flywheel. Pistons are fitted with two compound and one single type ring for greater operating efficiency.

The lubrication system is efficient and simple. Oil is forced after filtration by a gear pump from a reservoir in the base of the engine case through tubing to all motor bearings. The cylinder walls and pistons are lubricated by spray



Phantom View of the Centre Section of the New Packard Rear Axle Housing, Showing the Worm, Gear and Differential.

ing parts. The new Packard trucks have a worm driven system, the drive being through radius rods, but the Mack trucks, also worm driven, differ from the Packards in that the drive is through the forward ends of the rear springs, instead of radius rods, this being a common European practice. The Fremont-Mais designer has utilized the internal gear driving system to these vehicles.

PACKARD'S WORM DRIVEN TRUCKS.

The 1915 announcement of the Packard Motor Car Company, Detroit, Mich., specifies a se-

from the crank pin bearings and overflow from the wrist pin bearings. Splash and spray keep the cams, camshaft and tappets well lubricated, while the timing gears are supplied by overflow from an oil screen and by-pass at the forward end of the engine. The oil pressure is shown by a gauge on the dash.

Ignition is by the Packard-Bosch high-tension magneto, dual system, using one set of spark plugs, this having a battery for starting or spare. The carburetor is exclusively a Packard design and construction, being a float feed type having a large mixing chamber directly over the aspirating nozzle, which is automatically regulated for all motor speeds. Carburetion and quick starting in cold weather are promoted by a hot water jacket, and by air intakes equipped with shut offs. There is an automatic governor of the cen-

power take off is supplied. The service brake, consisting of two wire woven, asbestos lined shoes, and located directly back of the gearset, serves to throw the stresses of braking upon the cross member instead of upon the transmission case. The emergency brakes are of the internal expanding type, which act upon steel drums in the rear wheels, being controlled by a hand lever.

A carefully developed design is the power transmission from the gearset by a shaft with grease packed, oil tight universal joints to a worm and gear wheel incorporated into the full floating rear axle. The worm is above the gear, both of which, including the differential, form a unit which permits quick removal. The springs, which are set outside of the chassis, thus lowering the gravity, are of the semi-elliptic type, both ends of the rear set being shackled.



Three-Ton Packard Worm Driven Truck, Showing the Centralized Control Board Forward of the Steering Wheel, and a Standard Packard Body, No. 130 Stake Type.

trifugal type in the carburetor intake designed to afford an option of speed according to type of chassis.

Positive water circulation in the cooling system is promoted by a gear-driven centrifugal pump at the left side of the motor. A cellular type of radiator is utilized. Indicative of the completeness of details is the Motometer on the radiator cap which shows the temperature of the water.

The clutch is of the Packard dry plate type in unit, which can be removed without interfering with motor and steering gear. This type was decided upon for endurance and efficiency after long experience in service.

Three speeds forward is provided by the gearset, which is mounted on three points on two pressed steel cross members. When desired a

The steering gear is a worm and sector type, the worm and sector being forged integral with their respective shafts. Directly in front of the steering wheel is a column on which is mounted a board containing all the control levers, the wheel being left clear for convenience. The tires are single, solid band on the forward, dual solid band on the rear wheels. Wheelbases are optional in that the two-ton can be supplied with either 144 or 168-inch measure, while the three-ton has 156 and the four-ton a 196-inch wheelbase. The front tread is 58½ inches; the rear is 60½ inches.

FREMONT-MAIS MODELS O AND P.

Protection and accessibility to all working parts is unusually provided for in the Fremont-

Mais trucks, models O and P, built by the Lauth-Juergens Motor Car Company, Fremont, O. The engineer carefully investigated the best features of the European and American makes before designing these trucks, of which model O has a freight capacity of 3000 pounds, and model P, 5000 pounds. One notable feature, which is stated to be highly developed by Alfred F. Mais, is the internal drive gear.

Accessibility to power plant is provided for by making the engine, clutch and gearset in unit, which can be lifted clear of the chassis after removing a few bolts. Working parts are enclosed and operate in oil or grease, or are lubricated by oil or grease cups.

The motor, suspended from three points, is a four-cylinder, L head type, water cooled, and has a bore of $3\frac{3}{4}$ inches for the 3000-pound truck, and $4\frac{1}{8}$ inches for the 5000-pound. The horsepower of the former is rated by the S. A. E. formula at 22.5, and for the latter at 27.25. The manufacturer states, however, that much greater horsepower can be developed. The lubrication is by a combination force feed and splash system. The ignition by an Eisemann high-tension magneto.

The clutch is the cone type, faced with chrome tanned leather over springs, which insure easy engagement, and which can be adjusted from outside the clutch. The gearset is the four-speed ratio selective type. The drive shaft is tubular. The rear axle, upon which the load is carried, is of the dead type, the drive being through a jackshaft and the forward ends of the rear semi-elliptic springs, which are pivoted on large drop forged steel hangers. This form of drive is a European practise, which is very general and this suspension absorbs driving and braking stresses. To facilitate loading and to obtain low centre of gravity, the rear springs are set outside the chassis frame, the spring seats being cast integrally with the rear axle. The front springs are mounted underneath the frame.

Powerful braking effect is obtained by external contracting brake shoes operating in the drums on the rear wheels.

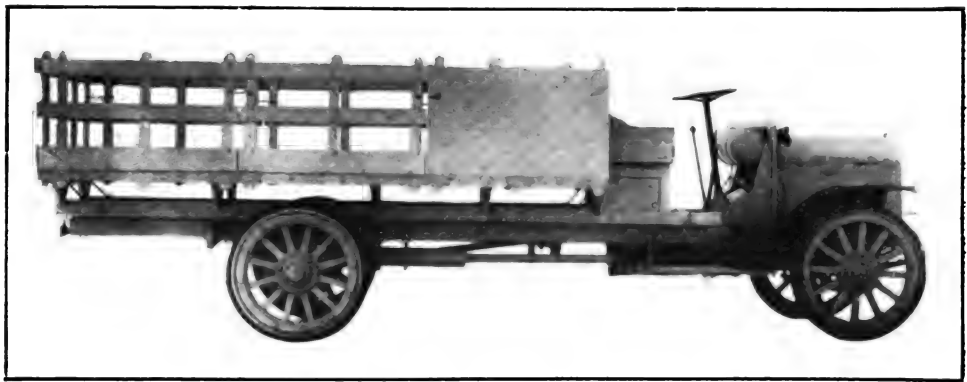
Artillery type wheels are utilized, the front set being equipped with 36-inch single solid band

tires, and the rear with dual tires. The 3000-pound truck has a wheelbase of 132 inches, with option of 144 inches if specified by the purchaser; while the heavier truck is built with a 144-inch wheelbase, with option of 132-inch if ordered. The tread of the forward wheels is 58 inches and of the rear wheels 60 inches.

The steering column is at the right, and it has a wheel 18 inches in diameter. Two levers beneath the wheel control the throttle and air supply of the carburetor, while the clutch is actuated by a left foot pedal, and the service brake by a right foot pedal.

WORM DRIVE FOR MACK TRUCKS.

One of the main features of the two new types of Mack trucks of 2000 and 4000 pounds capacity being produced by the International Motor Company, New York City, is the worm and gear drive. The driving shaft extends from the gear-



Model O 1½-Ton Fremont-Mais Chassis Showing How Load Is Carried on the Dead Rear Axle.

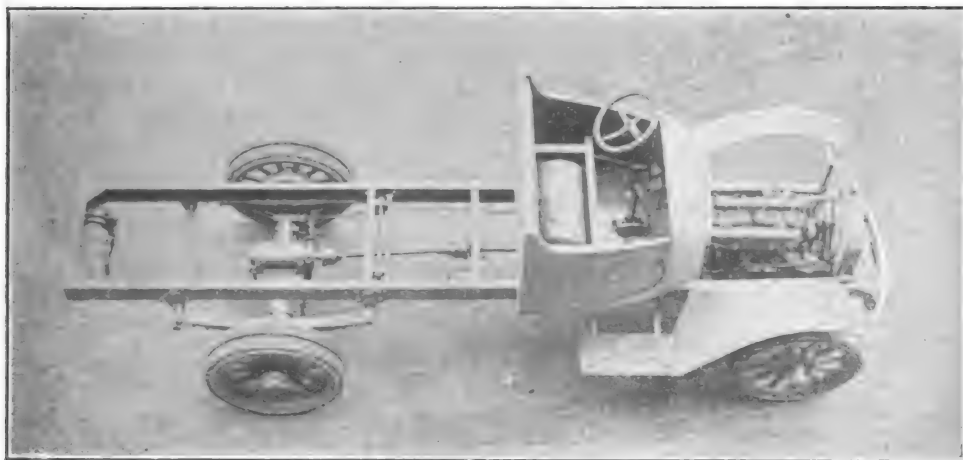
set, which is a component of a unit power plant made up of engine, clutch and gearset, through a bearing mounted beneath a strong frame cross member, and back of this bearing it is fitted with two universal joints, and is coupled by a telescopic joint with the worm shaft in the rear axle, which is full floating and of the well known David Brown type. The worm shaft, gear and differential are mounted on the cover plate of the large centre section of the axle housing.

One feature the manufacturer calls attention to is that when the worm, gear and differential are assembled and adjustment is made at the factory, no further attention is necessary. At the ends of the axle shafts are clutch plates which engage with plates in the rear wheel hubs, it being possible to remove these shafts by taking off the hub caps. The full load falls upon the axle housing, which is constructed to carry a load much in excess of the stated capacity. Brackets

for emergency brake shafts are fitted on the axle housing.

Power is supplied by a four-cylinder, vertical,

tractor, farmer, livery man, postoffice, transfer companies, etc. A contractor can send a dozen workmen with their tools from one job to another, or an emergency load of building material can be carried. The farmer who requires a speedy transfer wagon between the farm and town, or who wants to haul a load of produce, 50 cans of milk, crated live stock, etc., over country roads at 30 miles an hour, can meet these requirements with the Studebaker machine.



View of Chassis of Two-Ton Worm Driven Mack Truck, Showing the Drive Through the Forward Ends of the Rear Springs.

four-cycle, L head type of motor, which has valves at the right side. The cylinders are cast in pairs, having a stroke of five inches and a cylinder bore of four inches, which is rated by the S. A. E. formula at 26.6 horsepower. It is claimed, however, that the engine will develop an average of 30 horsepower during a continuous 10-hour test. The pistons, made of a special iron, are very long and light, and are balanced separately and again balanced with the connecting rod to insure a smooth running motor.

STUDEBAKER COMMERCIAL BODIES.

The Studebaker Corporation, Detroit, Mich., is building commercial bodies of many types for installation on standard Studebaker four-cylinder chassis. In the accompanying illustration a combination station and baggage car body is shown, this being equipped with electric starting and lighting, etc.

This body is designed principally for hotel use. It is fitted with seats running lengthwise on either side, which may be lowered against the sides, affording maximum room for carrying trunks, bags, etc. This car will carry 10 passengers in comfort.

With this body a machine may be used by the con-

This machine, it should be added, is particularly adaptable to the use of the jitney 'bus. It is a sturdy and worthy product of this concern and is standardized throughout.

OFFER \$10,000 FOR AMBULANCE.

A commission has been formed in London, England, to investigate ambulance designs and to report on a standard form for government specification. This commission will act as a judging committee for the reward of \$10,000 in prizes provided by the Wellcome bureau of scientific research for the best design for an ambulance to fit all standard motor chassis for field service.

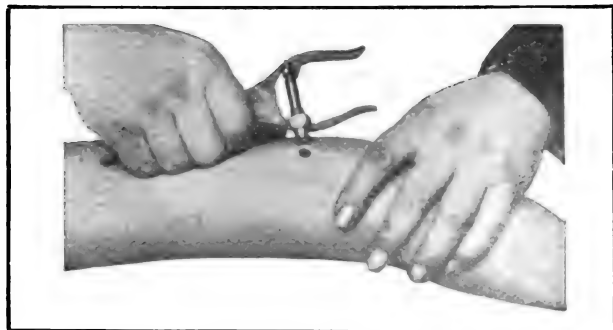


The Studebaker Commercial Car Which Is Being Used Extensively as Hotel Carriers and Jitney 'Buses.

SAMPSON REPAIR PLUG.

Stevens & Co.'s Outfit Will Make a Permanent Restoration Without Cement or Patches.

Stevens & Co., 373 Broadway, New York City, is marketing the Sampson repair kit, which is a complete equipment for repairing punctured tire tubes. These plugs are made in two sections and are drawn together by a threaded wire. A special tool is provided for distending the opening in the tube so the plug may be in-



Showing Operation of the Sampson Repair Kit.

serted, and afterwards the two halves are screwed together by means of the threaded wire. The wire is then broken off, the repair completed without the use of cement or gasoline, or cleaning the tube or plug. The Sampson tool and plugs are sold in a neat container. Dealers interested in this high-grade specialty can, by writing the company, obtain full information regarding prices, discounts and selling plans.

HIGHLAND COMMERCIAL BODIES.

Dealers Are Offered Large Field in Handling Product of the Cincinnati Company.

The sales policy of the Highland Body Manufacturing Company, Station P, Cincinnati, O., afford any Ford or other car dealer an exceptional opportunity to sell commercial bodies for Ford chassis. As an agent for this company the dealer need not make an investment or carry stock. Immediate deliveries are made by the company from its factory stock of standard types, it being one of the largest body building companies in America. The Highland Ford car commercial bodies are interchangeable with any Ford chassis, and can be supplied with special fittings for any service. The company also builds standard type bodies for Overland, Buick and practically all other makes and models of machines.

Highland bodies are built in all types, enclosed and open, to meet the demands of any service. They are designed to have great endurance, are constructed of highest grade materials, and in appearance and finish are equal to the best special work. In connection with such agencies the Highland coupe top for Ford cars can be sold. This top can be attached to a Ford roadster in 50 minutes, and has been sold in large numbers. The all-the-year-round use of Ford cars in nearly every climate has necessitated protection for the driver in cold and stormy weather, which can be provided by the Highland coupe top. The top is handsomely finished. It can be installed by any owner and is interchangeable with any Ford chassis. Automobile dealers and garage managers, who are seeking an agency that promises large profits, without investing capital, can obtain details of the agency proposition by addressing the company, and by

asking for catalogue 15 A, which gives specifications of the Ford bodies.

HARRIS OILS AND GREASES.

High Quality Lubricants That Are Recognized as Standards by the Motoring World.

The Harris oils and greases, manufactured by the A. W. Harris Oil Company, 326 South Water street, Providence, R. I., are refined from the best grades of Pennsylvania crude oils, by processes that have been perfected through more than 30 years' experience, to meet the exacting requirements necessary for gasoline engine use. The company, previous to manufacturing its motor oils and automobile greases produced lubricants for steam engines and machinery of all kinds, and this knowledge was the foundation upon which its motoring products were developed.

Dealers who are interested in developing a high-grade lubricant department can obtain full information as to the company's agency proposition by addressing the company.

RUB-ON DISPLAY CABINET.

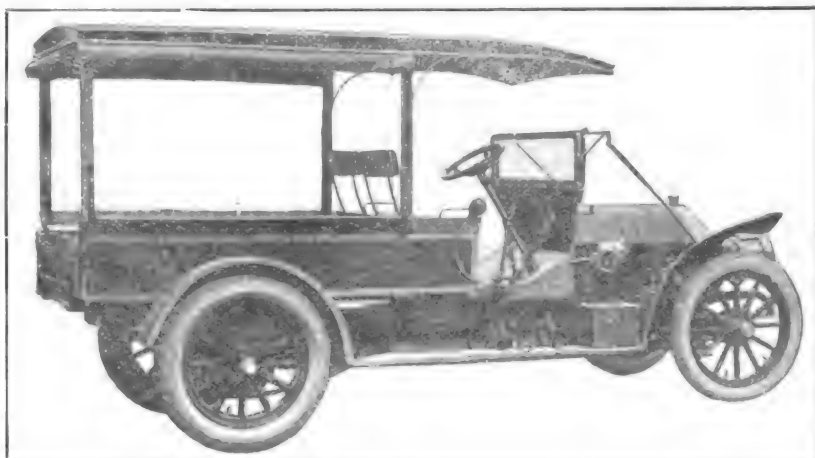
Buffalo Concern Offers Dealers and Garage Men a Show Case for Its Products.

The Rub-On Manufacturing Company, Buffalo, N. Y., is continuing to offer to dealers and garages a handsome selling cabinet for displaying its products. This company manufactures the Rub-On auto top, dressings and dyes, Sta-Fix radiator mend, the auto turn jack and other widely advertised automobile specialties. This cabinet is designed for displaying the company's varnishes, dyes, etc., and is considered an excellent business producer by the firms that are using it.

FORD SPECIALTIES DIRECTORY.

Publisher of This Book Will Send a Copy to Ford Dealer Gratis—When Request Is Made.

The Automobile Trade Directory, 243-249 W. 39th street, New York City, is to issue a directory of Ford specialties, which will be complete and authentic in every detail. The company states that it will be on a par with the service that has made the Automobile Trade Directory the standard buyers' reference of the American automobile industry. A copy of this directory



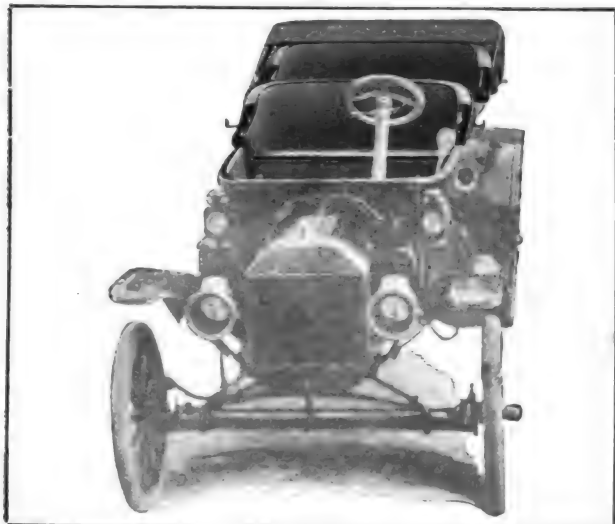
A Highland Express Body with Standing Top Fitted with Side and End Curtains.

will be presented to every Ford dealer in the country with the compliments of the publisher. It will be ready April 20, and will be extremely valuable to any Ford dealer. All that is necessary to obtain it is a request written on firm's letter head or business card.

BADGER SEAT COVERS.

Wisconsin Auto Top Company Catalogue That Shows the Dealers How to Make Money.

By addressing the Wisconsin Auto Top Company, Racine, Wis., Dept. 7, the dealer interested in a standard, quick selling line will receive a complete catalogue on



Showing How the Badger Seat Covers Look on Ford Car.

Badger seat covers. These covers are used on Ford, Overland, Buick, Studebaker, Maxwell, Dodge and Krieger cars, and represent every high quality. Badger covers may be secured in cravenette, English mohair, English serge, black and white, brown and white and waterproof.

LONDON FORD CHASSIS BODIES.

Full Line of Standard Types Produced to Meet Requirements for Light Delivery Service.

The London Auto Supply Company, 2540 Wabash avenue, Chicago, Ill., is manufacturing a large number of standard types of bodies that are adapted for installation on Ford chassis for delivery purposes. The bodies are carefully designed, are made to be interchangeable with any Ford chassis, and are constructed of the best materials obtainable. The bodies are built to meet the requirements of all business men who require fast, light delivery equipment, and so made as to endure hard service, having hard wood frames, rolled steel panels, which are packed with felt to prevent rattle, all the joints are strongly braced with steel brackets and the windows are polished plate glass. When desired they are finished in any color or with desired decoration, or can be supplied in the lead.

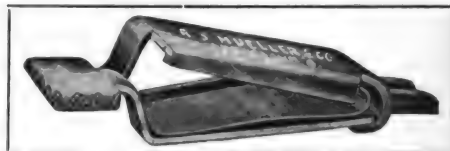
Dealers who sell the London bodies can supply any demand for high-grade Ford chassis equipment without investment, making sales from catalogues and having the deliveries made direct from the factory. The bodies are shipped with all requirements for installation, and are sold with the fullest guarantee. Full information relative to its agency proposition will be sent by the company at request. From the detailed specifications the dealer will receive from the London Auto Supply Company he will see that

these bodies can be used for every conceivable purpose. The list is complete in every detail and will well repay any dealer who is interested to write immediately for specifications and data.

UNIVERSAL TEST CLIP FREE.

R. S. Mueller & Co. Will Present One to All Dealers Who Make Inquiry for Details.

R. S. Mueller & Co., 431 High avenue, Cleveland, O., manufacturer of the Universal test clip, is offering a sample clip free to all in the trade who request it. This clip is a large time economizer when used in charging storage batteries, and can be utilized for a number of useful purposes in a garage or repair shop where electrical connections are made. That a complete demonstration of the practicability of the Universal test clip may be made, the company offers to send one free providing the writer uses the letter head of his company or his business in making the request.

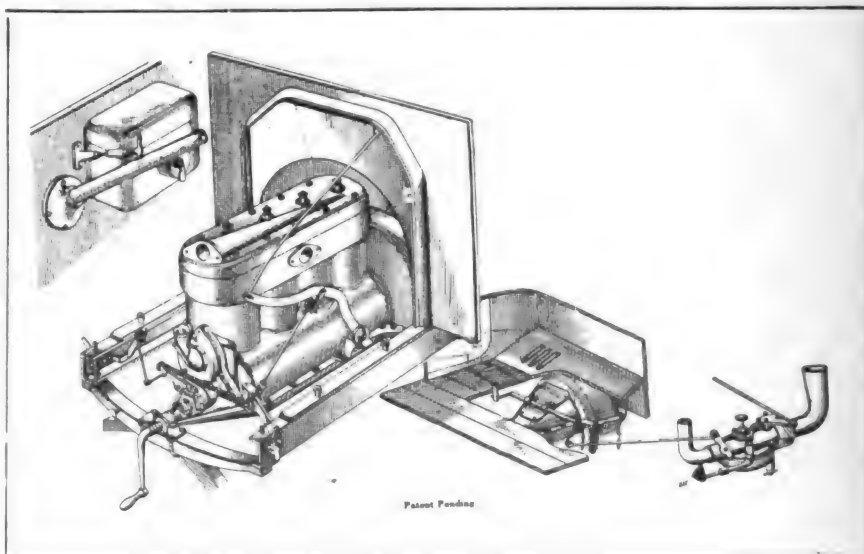


Universal Test Clip.

HUNTER FORD CAR STARTER.

Chicago Company Offers Dealers a Much Desired Equipment to Sell at Popular Price.

The Hunter Auto Supply Company, 333 W. Madison street, Chicago, Ill., is selling the Hunter starter for Ford cars for \$10. This, the company claims, is an extremely practical mechanical device that can be operated from the seat by a woman or child. The efficiency of the starter and the price are very potent reasons why dealers should profit largely through agencies. The Hunter starter can be installed in any Ford car in an hour's time. The accompanying illustration shows the simplicity of operation. Starting is effected by drawing a handle from the dash toward the seat, then releasing it to be drawn back by spring pressure. The starting crank is retained. The apparatus is located under the hood, with the exception of the starting handle, which is on the



The Hunter Starter, Made Exclusively for Ford Cars.

dash. Dealers who are interested can obtain from the company at the above address full details of the agency contract it is making with dealers.

PRACTICAL MOTOR CAR REPAIRS.

LEAKAGE of oil from the crank case of the engine through the guides for the valve tappets is a certain result when the guides become worn, and aside from the loss of the lubricant and the general covering of oil that will cause the accumulation of dust on the engine, and result in more rapid wear because of the abrasive effect of the combined dust and oil, the tappets will be noisy in operation. Those who have occasions to work about a motor, understand the probability of damage to clothing from dirty oil, for no cleaning process will thoroughly remove the lubricant from a fabric.

The best restoration would be renewals of the guides and tappets, if badly worn, but considerable improvement can be made without incurring this expense, both with reference to leakage and oil, and with soft steel or bronze guides a repair

may be used as an oil filler, but if there is a filler a better job can be made by soldering a piece of fine wire gauze across the top, which will prevent dust and foreign substances reaching the crank case. This assembly is shown at Fig. 1 D.

Assuming that the guides are not too greatly worn, leakage from compression can be prevented by cutting channels in the guides or tappets, as is illustrated at Fig. 1 A, B and C. By reference to these one will note that a longitudinal groove is cut in the tappets shown at A from a point close to the top of the guide to the mushroom head. Several of these grooves, preferably three, about $\frac{3}{16}$ -inch depth, will cause sufficient drainage of the oil to prevent it working through the guide, and when the tappet is raised the grooves will afford release for the compression. At Fig. 1 B is shown a tappet with a cir-

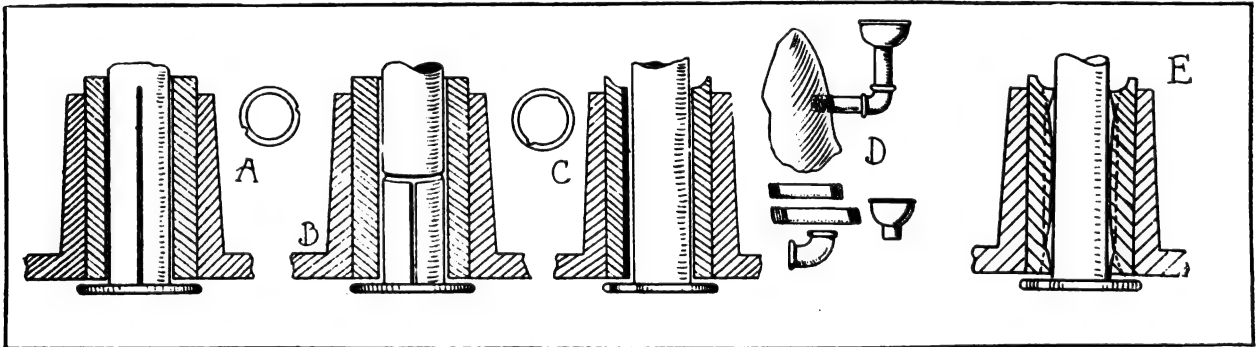


Fig. 1—A, Tappet with Longitudinal Groove; B, Tappet with Circumferential and Longitudinal Grooves; C, Groove in Tappet Guide; D, Inexpensive Breather; E, Worn Guide Repaired by Upsetting.

is practical that will be as satisfactory and as efficient as the milled centre type of guide.

If the motor is a type without breathers the leakage from crank case compression can be greatly reduced by fitting what is in effect an air inlet. This can be made from two short pieces of pipe, brass or iron will serve, an elbow and a cup. The pipe should be heavy enough to withstand a blow of considerable force. The inside diameter of the pipe should be either $\frac{3}{8}$ or $\frac{1}{2}$ inch. The lengths of the two sections will depend upon the design of the crank case, for the horizontal piece (the longest), should extend sufficiently to clear the side of the case and carry the upright and the cup. A hole is drilled in the crank case wherever convenient above the oil level and tapped. The ends of both sections of pipe are threaded. These are coupled by the elbow. Then one end is screwed into the tapped hole in the crank case and on the other is screwed the cup. This cup

cumferential groove about midway its length, about $\frac{1}{8}$ -inch depth, with two longitudinal grooves from the base to the centre. The centre groove will collect the oil and the vertical channels will effectually drain the guide of all lubricant. At Fig. 1 C the process is reversed in that the grooves are cut in the guide, the full length, and the top of the guide is chamfered from the external to the internal circumference, this forming a cup in which the oil will collect and be carried off through the grooves to the crank case. At Fig. 1 E is shown a method of restoration in the event that the guide is soft steel or bronze and is worn so the play is noticeable. The guides are removed from the flange plates of the cylinders, and are placed on a mandrel to prevent pressure distorting them. The mandrel should be brought to the top of the guide and the guide placed in a vise. With an upsetting punch the edge of the metal can be upset so that it will de-

PRACTICAL MOTOR CAR REPAIRS.

crease the internal diameter, the metal being forced downward at the inside, so that the edge will be at an angle to the longitudinal plane of the guide. The angle will depend upon the necessity to constrict the guide. Turning the guide, the process can be repeated, and with reasonable care the ends of the guide can be made to fit the tappet perfectly. If the guide is worn in the centre there will be a clearance, if the work is well done, that will collect lubricant, and which will prevent it working out at the top. Upsetting metal has also the effect of somewhat hardening it, so that the guides will endure excellently.

FITTING PISTON RINGS.

The fit of the piston rings in a cylinder is very important for several reasons. If not well fitted

the ring there is possibility that it may be used if a strip of thin metal be placed back of it in the channel of the piston, which will slightly increase its diameter when in the cylinder, the metal strip being behind that section that had not previously contacted perfectly. If the ring has lost its elasticity, as well as not fitting, it had best be discarded and replaced with new.

When new rings are fitted the gap (where the ring is split) should not be too large, and the ring should only close sufficiently so that it may be contracted so it can be inserted in the cylinder. If the owner is uncertain concerning this work the advice of an experienced man should be sought. New rings should be perfectly smooth, and if not they should be polished on an oil stone. Care should be taken that the ring channels are cleaned, and before fitting the rings they should

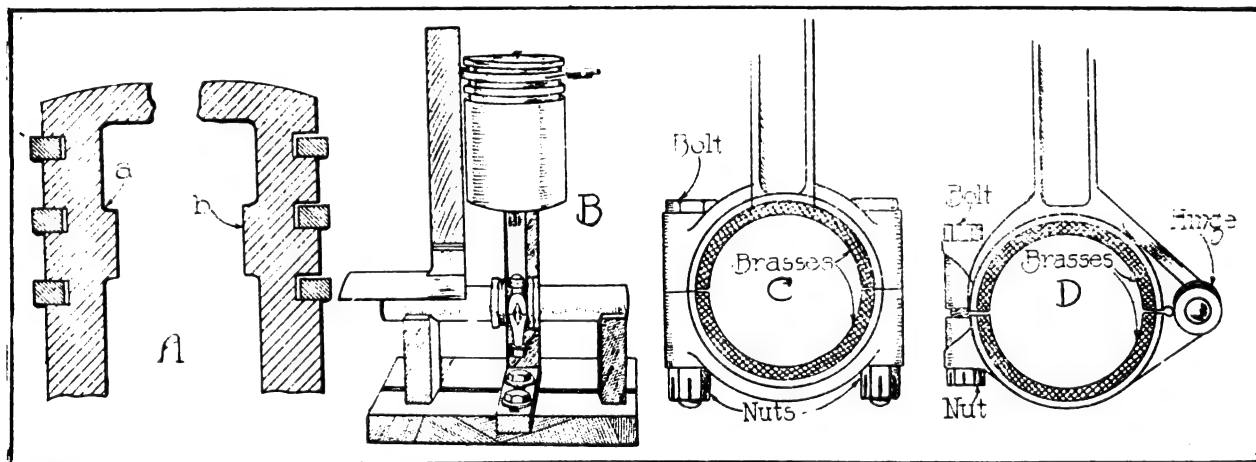


Fig. 2—A, "a" Correctly Fitted and "b" Incorrectly Fitted Piston Rings; B, Method of Aligning Piston; C, Cap Type of Connecting Rod; D, Hinged Type of Connecting Rod.

the compression will be low, the expansive effort of the explosion will be reduced, fuel will be unnecessarily consumed without power production, speed of the vehicle will be reduced and its serviceability lessened, and lubricant will work into the combustion chamber, where it will be partially burned, causing deposits on the piston and in the combustion head that must of necessity be removed. There are other probable results, such as preignition, which need not now be considered.

Piston rings may lose their elasticity from wear or from heating, and when warped heated gas may pass them. If the fit is good the piston ring will be polished, but if gas escapes the points of leakage will be discolored. If the leakage is for a considerable part of the circumference of

be well oiled.

The rings can be expanded sufficiently so that they can be pushed over the head of the piston, with two or three thin metal strips between them and the piston to prevent the ring slipping into the grooves. The rings should be worked on in this manner, the gaps being as widely separated as is possible. At Fig. 2 A is indicated examples of piston ring fitting, that at "a" being rings that are well fitted, and at "b" rings that are too large and too narrow to afford the best results.

ALIGNING PISTONS.

When connecting rod bearings are adjusted they must not only fit the contour of the surface

PRACTICAL MOTOR CAR REPAIRS.

of the crank pins of the main shaft, but they must also be aligned with reference to the position of the piston in the cylinder, that there shall be no inequality of pressure upon the cylinder walls. That is, if the piston is not in exact truth when the connecting rod bearing is fitted there will be side pressure on either the forward or the rear wall of the cylinder, and there will be excessive friction.

The connecting rod bearing can be aligned when the crankshaft is on the bench by assembling the bearing and placing it on a mandrel that it will fit. This mandrel can be placed on two V blocks, as is illustrated at Fig. 2 B, and the piston and connecting rod set upright on it, a

shaft is removed from the crank case, as the shaft may be clamped in a vise and the condition of the bearing determined exactly before work is begun. The fitting can be done with the shaft in the crank case, but there is a good deal of unnecessary work involved. If the bearing is loose it may be adjusted by shims, for practically all connecting rod bearings are adjustable by shimming. Old type bearings that are not adjustable may be reduced in diameter by filing the longitudinal edges until they will contact with the crank pin the full length, and then they can be scraped in the usual way.

The main bearings may or may not be shimmed, but if not the diameter can be reduced

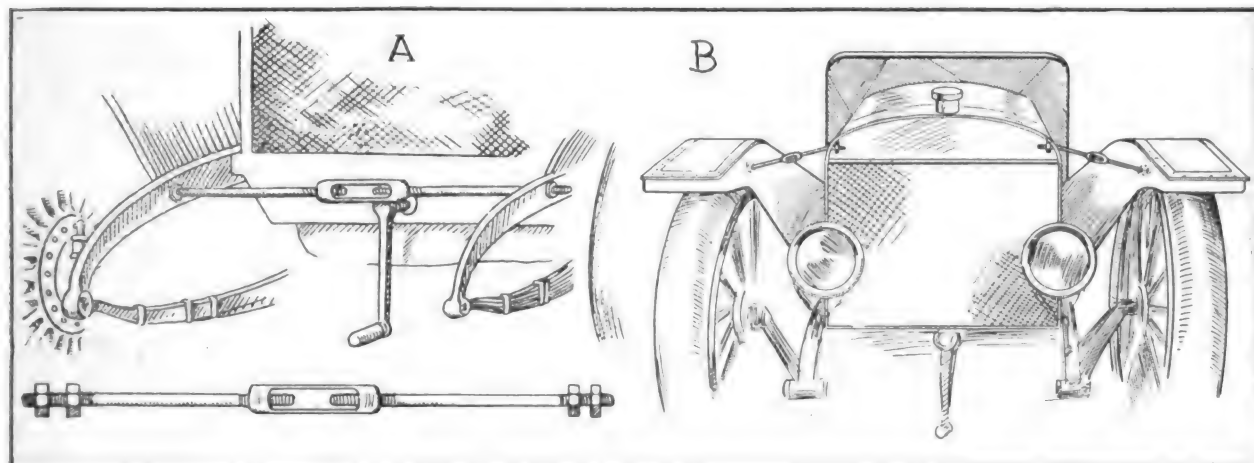


Fig. 3—A, Cracked Chassis Frame Reinforced by Plates and Tie Rod Between the Spring Horns; B, Rattling Mudguards with Stays to Radiator.

bar or brace being in contact with the piston. A square with a V shaped arm is placed longitudinally on the mandrel and with the edge against the piston any variance from the correct plane can be determined. With a sheet of white paper behind the piston a very slight untruth can be discerned. The misalignment can be corrected by scraping the bearing slightly, and in this manner the adjustment can be made perfectly without any unnecessary work. There are those who maintain that if the misalignment is slight that this can be corrected by setting the connecting rod in a vise, but this is not advised and it is not workmanlike.

SCRAPING BEARINGS.

What is decidedly the better way to fit main and connecting rod bearings is when the crank-

shaft is removed from the crank case, as the shaft may be clamped in a vise and the condition of the bearing determined exactly before work is begun. The fitting can be done with the shaft in the crank case, but there is a good deal of unnecessary work involved. If the bearing is loose it may be adjusted by shims, for practically all connecting rod bearings are adjustable by shimming. Old type bearings that are not adjustable may be reduced in diameter by filing the longitudinal edges until they will contact with the crank pin the full length, and then they can be scraped in the usual way.

Bearings of babbitt and other soft metals should fit closer than those of bronze and the shaft should rotate with some pressure on the crank pins. When the motor is operated by its own power the bearings will quickly "wear in" and what may appear to be a tight bearing will soon wear to an exact fit. The soft metal bearings are usually carried in brass shells, as are

PRACTICAL MOTOR CAR REPAIRS.

shown in Fig. 2 C and D. The rods are either the cap or hinged type, the caps being retained by bolts, either two or four, or by one or two clamping bolts.

MICROMETER MEASUREMENTS.

Micrometers that will measure to 1/1000-inch are instruments that are common enough with good workmen and they are extremely useful where exact work is desired. They are not necessary for such general work as an owner would do about his car, because such accuracy as their use demands is not attempted save by good mechanics. The usual micrometer caliper, which is shown at Fig. 4, will give any dimension up to one inch by thousandths. But much smaller measurements can be closely estimated. The in-

shown an inside micrometer gauge that is designed for measuring rings, setting calipers, comparing gauges, etc., and by the use of extensions measurements of from three to six inches may be made by thousandths. At Fig. 4 D is illustrated a micrometer depth gauge that has a 1/2-inch movement of the screw, indicating by thousandths, but with 2 1/2-inch and one-inch standard collars to slip on or off the spindle readings to 2 1/2 inches may be obtained.

SOME INGENIOUS REPAIRS.

A cracked or sprung chassis frame is not dependable, and yet because of the expense of renewal many men will, unless the fracture is too serious, endeavor to make repair. Restoration may be made by autogenous welding, by fitting

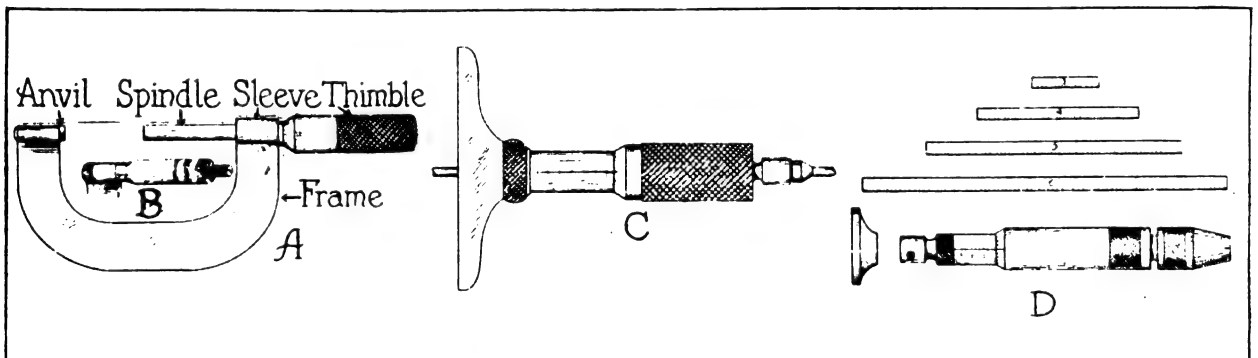


Fig. 4—A, Micrometer Caliper; B, Spindle and Sleeve of Micrometer Caliper; C, Micrometer Depth Gauge; D, Micrometer Internal Gauge.

strument is in three parts, the frame, which carries the anvil or stationary end, and the spindle, which is attached to the thimble that revolves with it. The turning of the spindle causes it to approach or recede from the anvil, and the measurement is indicated by lines and figures on the sleeve and thimble. The pitch of the screw is 40 to the inch and one complete revolution will move the spindle forward or back 1/40 or 25/1000 of an inch. The sleeve is marked with 40 lines to the inch, corresponding to the number of threads on the spindle.

At Fig. 4 is shown a ratchet stop, and this is designed so that the ratchet will slip past the pawl when more than the ordinary pressure is applied, this preventing the spindle turning, which might spring and damage the instrument. This is generally used when more than one person are using it, for the intention is that the same pressure shall be applied. At Fig. 4 C is

reinforcing plates or by braces. Of course the location of the failure may govern the work that can be done, but a frame side member cracked at a spring horn, made serviceable by a very practical job by a clever repairman, is an example of possibilities.

The steel channel was reinforced with riveted plates, and similar plates were placed on the other channel. In the plates and the channels were then drilled 5/8-inch holes and two sections of steel rod were cut and threaded at either end. Two nuts were screwed on the rod ends and the ends secured in the holes in the frame by two outside nuts. A turnbuckle was fitted to the ends between the frame members and this was turned until the required tension was secured. With this brace the machine is now in service and no failure has been experienced or is expected. The job is shown at Fig. 3 A.

Another owner, whose forward fenders caused

PRACTICAL MOTOR CAR REPAIRS.

considerable annoyance from rattling, conceived the use of braces which practically eliminated this fault. Two brackets were soldered to the sides of the radiator frame near the top of the tank. In these were eyes that would take a $\frac{3}{8}$ -inch rod. Four short sections of rod were cut and threaded at either end, and two holes were drilled in the fenders. On the underside of the fenders were placed two plates of $\frac{1}{8}$ -inch iron, through which the ends of two of the sections of rod were passed, and nuts screwed on. The ends of the other two sections were passed through the brackets on the radiator with nuts to secure them. Two turnbuckles coupled the four sections of rod at a sufficient tension. A coat of

spinning, but without a brake clutch stops are practical and may be installed at very small expense. The stop shown at Fig. 5 A is adapted for a chassis with a cross frame member that will permit it being mounted. A section of half-inch round steel rod is threaded at one end and fitted with a wooden block carrying a leather pad at the other end. A "T" piece of steel is bolted to the frame member. In this is a half-inch hole that is threaded to take the rod end, lock nuts holding it securely. The rod can be adjusted in this "T" piece so that when the clutch is withdrawn it will so contact with the leather faced block that it will be quickly stopped.

Another form of stop is shown at Fig. 5 B,

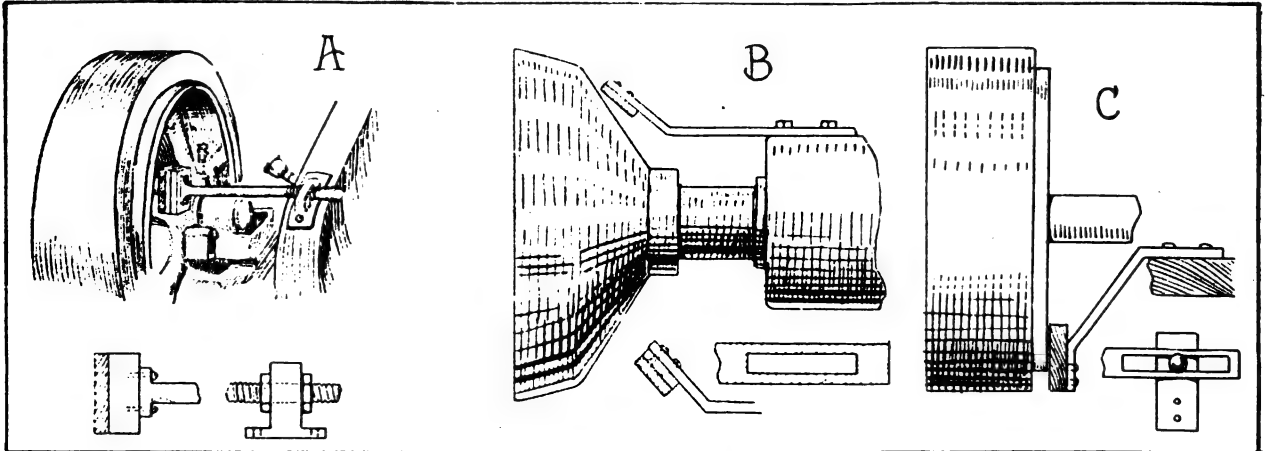


Fig. 5—A, Clutch Stop Fitted to Frame Cross Member; B, Clutch Stop Installed on Gearset Case; C, Clutch Stop Located on Sub-Frame.

enamel completed a very workmanlike job, which is illustrated at Fig. 3 B.

FITTING CLUTCH STOPS.

Many machines are fitted with clutch brakes which are intended to reduce the speed of the clutch so that the gears of the transmission gearset may be changed without clashing, for unless the pinions to be engaged are revolving at approximately the same speed they will clash. Gear clashing is noisy, but this is not the real objection to it, for attempts to mesh two gears moving at different speeds is certain to be destructive.

Good engineering does not approve braking on the chamfered edges of the gears. As the clutch is disengaged it will run free, and until this movement has diminished the gears ought not to be changed. The clutch brake will prevent

this being a piece of spring steel that is slotted at one end, the other end being bent at an angle, and to this end a solid leather pad is riveted. The piece of steel is secured to the case of the gearset by the studs and the slot will afford any adjustment that is desired. The spring will yield when the clutch is drawn against it and the action is less harsh and is more satisfactory than the other. A third form is seen at Fig. 5 C, which is intended to be installed on the sub-frame, this being adapted for chassis where the others cannot be used. A plate that is drilled to take two bolts is bolted to the frame. The stop is a section of spring steel on which is riveted a leather pad. The stop shank is slotted, as stated of type B, and is adjusted on the plate and firmly bolted. The design is that the pad will contact with the periphery of the clutch female member as it is withdrawn from the flywheel.

NEWS OF THE MANUFACTURER.

The Hayes Manufacturing Company, Detroit, manufacturer of automobile fenders, has brought out a crown fender for model T Ford cars which adds considerably to the grace and beauty of the car. The fenders are made of heavy material and will not drum. The price complete is \$14 a set of four.

The Goodyear Tire and Rubber Company, Akron, O., announces another big reduction in Goodyear tires, the third reduction in two years, or a total reduction of 45 per cent. "Our present action", says C. W. Selberling, vice president of the company, "is entirely logical, and is based on lower cost of crude rubber, the largest factory production in the world, the facilities afforded by ownership of our own fabric mill, our world-wide organization that gives us certain important advantages in purchasing crude rubber, and a desire to continue to give tire users the most for their money".

The Weldely Motor Company, Indianapolis, has taken possession of a modern factory at 133-143 South West street. The Weldely motor of today and for 1916 reflects the experience of hundreds of cars in the hands of all classes of men in all parts of the country, and the refinements based upon such exhaustive tests have resulted in even increased economy, power and speed with silence. The president of the company is W. E. Showers

netos, colls, horns, etc., will be carried in stock.

The Bridgeport Brass Company, Bridgeport, Conn., has issued a new catalogue of its Bridgeport pumps in pocket size. Automobile, motorcycle and bicycle pumps are illustrated and described.

The Tuthill Spring Company, Chicago, has developed the Titanic Unbreakable Spring to such a point that the spring is now guaranteed forever against breaking at the centre. The springs are made in all sizes and capacities, for pleasure cars and trucks.

The Ross & Young Machine Company, Detroit, has issued an eight-page folder describing the new Ross eight. The machine sells for \$1350 and is a five-passenger model.

The De Lion Tire and Rubber Company, Trenton, N. J., has opened a plant in that city employing 100 hands. H. H. Coleman is president of the new concern.

The Cadillac Motor Car Company, Detroit, equips the rear wheels of every car with anti-skid tires. This is done to give Cadillac owners protection against skidding and insure to them economical tire service.

The Blumel Buggy Company, Sidney, O., announces that it will soon produce a light five-passenger car, which will be known as the Elco 30. It will be equipped with a four-cylinder motor, a streamline body, one-man



Views of the Allen Motor Company Which Recently Absorbed the Somers Motor Company of Bucyrus, O.

and the vice president is George A. Weldely, who is also the general manager. W. A. Umphrey is treasurer.

The Allen Motor Company, Fostoria, O., has recently absorbed the Somers Motor Company of Bucyrus, O., the latter company being formed to manufacture a motor which was invented by L. A. Somers.

The Joseph Dixon Crucible Company, Jersey City, N. J., has gotten out a 16-page booklet, descriptive of Dixon's Graphite Automobile Lubricants, and introduces a new wrinkle for imprinting the dealer's name and address. The cover is in three colors, depicting the entrance to a garage or supply house, and above this is sufficient space for the display of the owner's name.

The Princess Motor Car Company, Detroit, announces that it will equip its 1915 model with electric self-starter and electric lights, top, windshield and electric horn, and that it will sell at \$495. This roadster will have 44-inch or standard tread as purchasers demand. The company's four-passenger model, which sells for \$625 fully equipped, will be ready for delivery on and after March 1.

The Helme Electric Company, Lowell, Mass., has opened a branch office in Minneapolis at 33 South 11th street. William Edwards, former manager of the Kansas City branch, is in charge. A complete line of mag-

net, electric starter and lights. The car will sell at \$500. A. C. Noble is president and T. M. Miller is manager and treasurer.

The Columbian Rubber Company, East Liverpool, O., has been sold to a syndicate of capitalists from Mansfield. The appraised value of the plant is \$85,000. Announcement is made that the plant will resume operations within a very short time.

The Keeton Motor Car Company, Detroit, has purchased the Keeton business from S. L. Winternitz. It is the intention of the company to reorganize and not only to continue to furnish all repairs for Keeton cars, but to continue to manufacture in a small way. According to announcement the company is able to furnish repairs promptly.

The Walpole Tire and Rubber Company, Boston, Mass., will reorganize. The stockholders committee has joined with the reorganization committee of which J. K. MacAlman is chairman and these two committees will act jointly in the interests of stockholders.

The Emil Grossman Manufacturing Company, Inc., Brooklyn, N. Y., is offering its 1915 catalogue of "Everlastingly Good" necessities, including the Happy Red Head spark plugs.

SUGGESTIONS FOR THE NEW CAR OWNER.

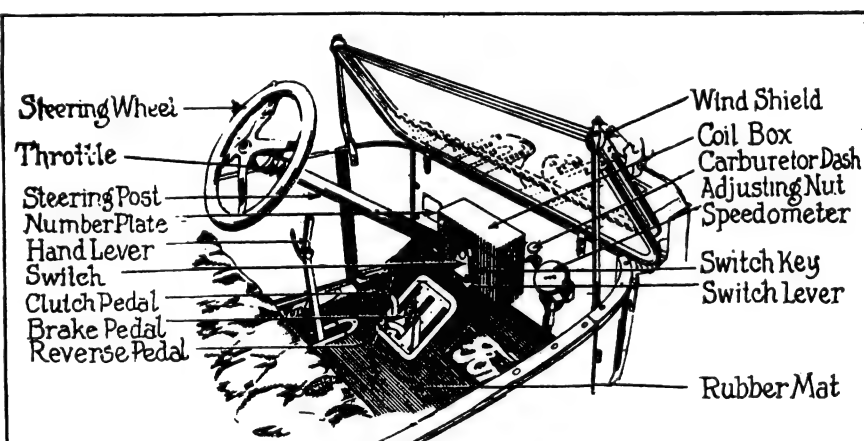
Functions of the Control Members of the Model T Ford Car and the Manner in Which They Are Operated to Drive Safely and Economically of Fuel.

The 19th article dealing with the construction, operation, care and repair of the model T Ford automobile, deals with the operation of the steering wheel, the throttle and the ignition control levers to obtain the greatest efficiency of the power developed with the most economical consumption of fuel. The matter of gasoline economy is a matter of much importance and should be definitely understood by the driver.

OPERATION of the car is accomplished by manipulation of a series of control members which have specific functions, and which are sometimes operated singly or in combination. Driving a car is not merely steering it and attaining fast speed when conditions will justify. The good driver must first of all understand what velocity means and should be a judge of distance, so that he will be able to act in time to thoroughly control the movement of the machine. Because of this necessity the man learning to drive should understand thoroughly the function of every controlling member. The steering wheel is operated by turning in the direction in which the car is to move, from right to left, to turn toward the left, and from left to right to turn toward the right. Under the steering wheel are two small brass levers, that at the right controlling the supply of fuel (gasoline vapor and air) for the motor, and that at the left controlling the ignition—regulating the time of the explosion of the gas in the cylinders with reference to piston position. The right lever is known as the “throttle”, and that at the left the “spark”. When the motor is in operation, drawing the throttle lever toward the driver will increase the supply of fuel and give greater speed and power for the engine. Drawing the left lever toward the driver will “advance” the spark, and this will cause the explosion of the gas when it is compressed to differing degrees. The movement of either lever will have decided effect, but the movement of both will have the greatest influence.

Position of Spark and Throttle Levers.

The best operation of the motor can be obtained by the greatest advance of the “spark” and the least fuel that will afford the required power. But when the “spark” is advanced beyond a certain point it will cause a dull knock with each explosion, which will continue until the “spark” lever is retarded or moved backward. When the motor is to be started the “spark” should be advanced to the third or fourth notch, and the “throttle” advanced from four to six notches, this depending upon conditions, for the motor should not be run idle at greater speed than is necessary to prevent it stalling or stopping until the driver takes his seat. The driver

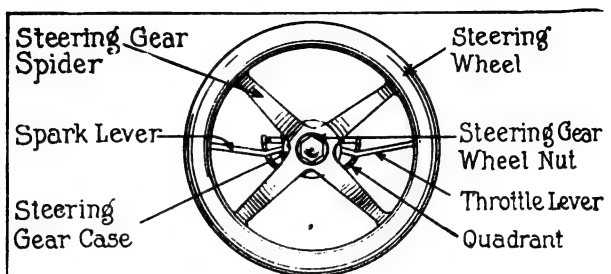


The Controlling Members of the Model T Ford Car, by the Use of Which It Is Driven and Guided, All Convenient to the Operator.

should never advance the spark beyond a point where the motor will fire, for back-firing is dangerous to the person cranking the motor, and it is absolutely unnecessary to take chances.

Before starting the car the driver should draw back the hand lever at the left of the seat as far as is possible. This is the neutral position and the clutch is disengaged and the rear hub brake is set so that the car cannot be moved when the engine is started. The switch key should be inserted in the switch on the coil box and the switch moved toward the left until it is stopped. This is the magneto position and closes the magneto circuit so that the motor can be started by cranking. Turning this switch to the centre will

open the circuit, and removing the key will lock the car so it cannot be started unless a key is used to release the switch and it is thrown.



The Steering Wheel, Showing the Locations of the Spark and Throttle Levers and the Components of Assembly.

Cranking the car is accomplished by pushing the crank handle backward toward the engine until it is engaged, and then drawing it upward with a quick movement. A quarter turn is sufficient to move the engine so that a spark will be caused in one of the cylinders and an explosion will start it turning. Turning the motor one or more complete revolutions is not necessary unless it is difficult to start, and then it should be done with the spark surely retarded so that there is no danger from back-firing and a backward turning of the engine, which might result in a broken arm. If the motor is cold the carburetor can be primed by drawing forward the wire at the lower left corner of the radiator, which will cause the carburetor to flood, increasing the normal supply of fuel, and turning the engine several times without the spark lever advanced will insure a good supply of gas being drawn into the cylinders.

That the engine may be started easily when cold, the carburetor adjustment, the knob of which extends through a bracket on the dash, is given a quarter turn toward the left, this supplying a richer mixture, or a greater proportion of gasoline. The engine can be effectively primed or charged by turning it with the carburetor flooded and then, with the throttle and spark levers advanced as stated, the magneto switch can be moved and the motor cranked. After starting the motor the spark lever should be advanced until it runs smoothly, but does not race, which may be from five to 10 notches on the quadrant. When the motor has become warm it will not require as much fuel and the carburetor adjustment may be turned back a quarter turn toward the right.

The driver must understand that fuel economy can only be obtained by burning as much air and as little gasoline vapor as is necessary to afford the power that will do a stated work.

Burning a weak mixture means a decided saving, and advance of the spark, maintaining it in practically one position, obtaining speed variations by changes of the throttle. Changes of temperature will affect the fuel supply more than anything else, the gasoline vaporizing freely when slightly heated, and less freely as it becomes colder. One of the really surprising conditions of motor vehicle operation is how little fuel is necessary to attain reasonable speed.

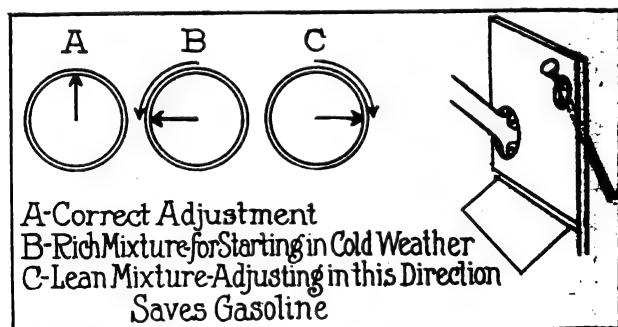
(To Be Continued.)

TROUBLE TO SHIP CADILLAC EIGHT.

Albion L. Danforth, manager of the Boston, Mass., Cadillac agency, experienced considerable trouble recently when he tried to ship a Cadillac eight to Frederic J. Stimpson, newly appointed ambassador to the Argentine Republic. The car had to go via London, and Mr. Danforth was forced to get United States government seals from Secretary of State Bryan to paste on the crate. All four sides of the crate were covered with reproductions of American flags, pasted together with other indications that it was the property of an American official and not subject to seizure.

GOODYEAR'S NEW PRESSES.

The Goodyear Tire and Rubber Company, Akron, O., has purchased 50 150-ton tire applying presses, and is planning to increase this order in the near future. These presses will be located in all cities where the Goodyear Company has branches and in many other cities the machines will be placed with the truck tire dealers. It is to give application service on its new S. V. tires



The Gasoline Supply Adjustment, Located on the Dash, and the Positions for Varying the Quality of the Gas.

that will equal the application service on demountable tires that the company is installing these machines.

Tarvia

*Preserves Roads
Prevents Dust—*



Wheaton's Experience with Tarvia—

Wheaton Avenue, looking west
from Franklin Street.
Wheaton, Ill.
Tarvia "X"—Constructed 1912.

ONE of the many towns which are using Tarvia on a vast scale is Wheaton, Ill., which has built several miles of "Tarvia X" construction, and also has used "Tarvia B" (a lighter form of Tarvia) for the prevention of dust on many of its other roads.

"Tarvia X" is a very dense viscid, heavy coal tar product. It is used as a binder in the lower course of a macadam road and has sufficient viscosity and strength to bridge the large voids in the foundations, thus enclosing the stone in a tough, plastic matrix from which traffic can never dislodge it.

When a heavy load passes over an ordinary macadam road it sets up a certain amount of internal friction, where the stones in the lower courses grind and press against each other, and a certain amount

of pulverization and disintegration results within the road itself.

In a road bonded with "Tarvia X", however, this internal attrition which forms such a serious problem for road engineers disappears entirely, and the result of the passage of an extremely heavy load is almost imperceptible. For preventing dust and preserving the surface of ordinary macadam roads "Tarvia B" is used in Wheaton. The city engineer of Wheaton writes:

"We have 23,000 yards of "Tarvia X" construction. This type of pavement is ideal for residential sections, it being an enduring, lasting, and cheap pavement. Wheaton has also used "Tarvia B" to a great extent for dust prevention. We find that the "Tarvia B" preserves the road and keeps it in a dry, clean condition, all four seasons of the year.

Yours very truly,

J. RUDDOCK, City Engineer."

Booklets about the treatment on request.

BARRETT MANUFACTURING COMPANY

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati
Pittsburgh Detroit Birmingham Kansas City Minneapolis Salt Lake City Seattle
THE PATTERSON MFG. CO., Limited: Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.



(When Writing to Advertisers, Please Mention The Automobile Journal.)

Buyers' Reference and Guide.

ACCESSORY MANUFACTURERS AND JOBBERS.

Alsten & Goulding Co., Worcester, Mass.
Auto Parts Co., Providence, R. I.
Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.
Times Square Auto Co., 56th St., at Broadway, New York City.
AIR COMPRESSORS AND TANKS.
Brunner Mfg. Co., Main Office and Factory, Utica, N. Y.; New York Office, Hudson Terminal Bldg., 30 Church St. (Brunner.)
Williams Foundry & Machine Co., Akron, O.

ANTI-RATTLERS.

King Specialty Co., Brookline, Mass.

ARBOR PRESSES.

Bartlett, Edwin E., 322 A St., Boston, (Greenerd.)

AUTOMOBILES. (See Cars.)

AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)
Motor Specialties Co., Waltham, Mass.

BALLS AND BALL BEARINGS.

Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1790 Broadway, New York City; 805 Woodward Ave., Detroit.
Boyd, F. Shirley, 175 Massachusetts Ave., Boston, (R. I. V.)
Marburg Bros., Inc., 1790 Broadway, New York, (S. R. O.)
New Departure Mfg. Co., Bristol, Conn. (New Departure.)
Norma Co. of America, 1790 Broadway, New York City. (Norma.)

BEARING METALS.

Bunting Bronze and Brass Co., 727 Spencer St., Toledo, O. (Bunting.)

BODIES—WOOD AND METAL.

Highland Body Mfg. Co., Cincinnati, O. (Highland.)
Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

BRAKE BANDING OR LINING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston, (Multibestos.)
Royal Equipment Co., 1378 Bostwick Ave., Bridgeport, Conn. (Raybestos.)

Standard Woven Fabric Co., Framingham, Mass. (Multibestos.)
Staybestos Mfg. Co., Lena and Armat Sts., Germantown, Philadelphia, Penn. (Staybestos.)

Thermold Rubber Co., Trenton, N. J.

BRUSHES, WIRE.

Williams Foundry & Machine Co., Akron, O.

BUMPERS AND FENDERS.

Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Diamond.)

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARBURETORS.

Air-Friction Carburetor Co., Dayton, O. (Model C.)
Findelsen & Kropf Mfg. Co., 2127 Rockwell St., Chicago, (Rayfield.)
Zenith Carburetor Co., Detroit, (Zenith.)

CARS—GASOLINE PLEASURE.

Inter-State Motor Co., 804 West Willard St., Muncie, Ind. (Inter-State.)

Metz Co., Waltham, Mass. (Metz.)
Nordyke & Marmon Co., Indianapolis, (Marmon.)

Palge-Detroit Motor Car Co., Detroit, (Palge.)
Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
Salvador Motor Co., Farragut Bldg., Massachusetts Ave., Boston, (Salvador.)

Scripps-Booth Co., Detroit, (Scripps-Booth.)

Studebaker Corp., Detroit, Mich. (Studebaker.)
Stutz Motor Car Co., Indianapolis, (Stutz.)

White Co., Cleveland, O. (White.)
Willys-Overland Co., Toledo, O. (Overland.)

Winton Motor Car Co., 131 Berea Road, Cleveland, O. (Winton.)

CARS—GASOLINE COMMERCIAL.

Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)
Duplex Power Car Co., Charlotte, Mich. (Duplex.)

Federal Motor Truck Co., Junction and Leavitt Sts., Detroit, (Federal.)

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
Independent Motors Co., Port Huron, Mich. (Independent.)

Jeffery Co., Thos. B., Kenosha, Wis.
Lanth-Juergens Motor Car Co., Fremont, O. (Fremont-Mals.)

Peerless Motor Car Co., Cleveland, O. (Peerless.)
Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Sanford Motor Truck Co., Syracuse, N. Y. (Sanford.)
Signal Motor Truck Co., Detroit, (Signal.)

Studebaker Corp., Detroit, Mich. (Studebaker.)
Sullivan Motor Car Co., Rochester, N. Y. (Sullivan.)

White Co., Cleveland, O. (White.)

CARS—ELECTRIC COMMERCIAL.

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

CEMENTS.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y. (Sta-Fix Radiator Mend.)

CHAIN LUBRICANTS.

Motor Accessories Inc., 749 A Boylston St., Boston, (Chain-Lub.)

CHAINS, TIRE AND ANTI-SKID-DING DEVICES.

Weed Chain Tire Grip Co., 28 Moore St., New York, (Weed.)

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston, (Baldwin.)

CIGAR LIGHTERS. (See Lighters.)
COILS.
Helme Electric Co., Lowell, Mass.

CONTROLLERS.

Pierce Speed Controller Co., Anderson, Ind.

CRANK HOLDERS.

King Specialty Co., Brookline, Mass. (King.)

CYLINDER CLEANING COMPOUND.

Bowling Green Sales Co., 42 Broadway, New York City.
Dyer Apparatus Co., Cambridge, Mass. (Oxy-Carbon.)

DRESSINGS, TOP AND LEATHER.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

ELECTRIC LIGHTING EQUIPMENT.

Carleton Co., The, 172 Summer St., Boston, (New Carleton No. 68.)
Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FAN BELTS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

FIRE EXTINGUISHERS.

Pyrene Co. of N. E., 88 Broad St., Boston.

FORD AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

FORD STARTERS.

Hunter Auto Supply Co., Hunter Bldg., 333 W. Madison St., Chicago, Ill. (Hunter.)

FUNNELS, AUTO.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind. (Ross.)

GENERATORS.

Carleton Co., The, 172 Summer St., Boston, (New Carleton No. 68.)

HEADLIGHT DIMMERS.

Chaney Co., L. F., Springfield, O. (Chaney.)

HEATERS.

Superior Mfg. Co., N. S. Pittsburg, Penn. (Superior Safe Garage.)

HORNS.

Garford Mfg. Co., Elyria, O. (Tuto.)
Lovell McConnell Mfg. Co., Newark, N. J. (Klaxon.)

JACKS.

Motor Specialties Co., Waltham, Mass. (Excel Auto.)

LAMPS.

Mabey's Electric & Mfg. Co., Indianapolis, (Mabey's Electric Trouble.)
Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Clamp.)

LEATHER GOODS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

LIGHTERS, CIGAR.

Mabey's Electric & Mfg. Co., Indianapolis, (Mabey's Electric.)

BUYERS' REFERENCE and GUIDE—Continued.

LIGHTING SYSTEMS, ELECTRIC.
Carleton Co., The 172 Summer St., Boston. (New Carleton No. 68.)
Garford Mfg. Co., Elyria, O. (Dyna-lux.)

LUBRICANTS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)
Continental Asbestos Corp., Worcester, Mass. (Spedolene.)
Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)
Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagleline No-Karbon.)
Harris Oil Co., A. W., 326 So. Water St., Providence, R. I.; 143 No. Wabash Ave., Chicago. (Harris.)
New York Lubricating Oil Co., 116 Broad St., New York City. (Monogram.)
New York & New Jersey Lubricant Co., 165 Broadway, New York. (MotoRol, Non-Fluid, Kejex.)
Standard Oil Co., New York. (Polarine.)
Texas Company, 17 Battery Place, New York City. (Texaco.)
Vacuum Oil Co., Rochester, N. Y. (Gargoyle Mobiloil.)
Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETO COVERS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.
Elsemann Magneto Co., 32 33d St., Brooklyn, N. Y. (Elsemann.)
Helme Electric Co., Lowell, Mass. (Heco.)
Marburg Bros., 1790 Broadway, New York. (Mea.)
Splitdorf Electrical Co., 98 Warren St., Newark, N. J.

MAILING LIST.

Trade Circular Addressing Co., 166 W. Adams St., Chicago.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

MOTORS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Michigan.)

MOTOR STARTERS.

Automatic Appliance Co., 172 Columbus Ave., Boston. (Boston.)

PATCHES, TIRE.

Braender Rubber & Tire Co., Ruth-erford, N. J. (Cementless.)

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

POLISH.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

PRESSES. (See Arbor Presses.)

PUMPS, TIRE.

Kellogg Mfg. Co., Rochester, N. Y. (Kellogg.)

RADIATOR CEMENT. (See Ce-ments.)

REAMERS.

Harding Distributing Co., Boston. (Martell Aligning.)

RINGS. (See Piston Rings.)

ROAD BUILDING MATERIALS.

Barrett Manufacturing Co., New York. (Tarvia.)

ROLLER BEARINGS.

Hyatt Roller Bearing Co., Detroit. (Hyatt.)

Norma Co. of America, 1790 Broad-way, New York City. (Norma.)

SEATS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Rac-ing.)

SEAT COVERS.

Perkins-Campbell Co., 622 Broad-way, Cincinnati, O.

SELF-STARTERS. (See Motor Starters.)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Sager Peerless.)

Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Peerless.)

Perkins-Campbell Co., 622 Broad-way, Cincinnati, O.

SPARK PLUG CASES.

Perkins-Campbell Co., 622 Broad-way, Cincinnati, O.

SPARK PLUGS AND IGNITERS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)

Bosch Magneto Co., 223-225 W. 46th St., New York.

Helme Electric Co., Lowell, Mass. (Heco Priming.)

Milwaukee Auto Specialty Co., 705-711 Chestnut St., Milwaukee, Wis. (Centerfire.)

Silvex Co., The, 171 Madison Ave., New York, N. Y.

Splitdorf Electrical Co., 98 Warren St., Newark, N. J.

SPRINGS FOR AUTOMOBILE SUS-PENSION.

Marburg Bros., Inc., 1790 Broad-way, New York. (Marburg-Hagen.)

Tuthill Spring Co., 776 Polk St., Chi-cago. (Titanic Unbreakable.)

SPROCKETS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

TEST CLIPS.

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Universal.)

THERMOS CASES.

Dover Stamping & Manufacturing Co., Cambridge, Mass.

TIMERS.

Motor Specialties Co., Waltham, Mass. (Bemus.)

TIRE ACCESSORIES.

Braender Rubber & Tire Co., Ruth-erford, N. J.

Stevens Mfg. & Supply Co., Fisher Bldg., Chicago. (Stevens Valves.)

TIRE CHAIN GRIPS. (See Chains.)
TIRE PRESERVATIVES AND PRO-TECTORS.

Braender Rubber & Tire Co., Ruth-erford, N. J.

TIRE REPAIR EQUIPMENT.

Stevens & Co., 373 Broadway, New York City. (Sampson Inner Tube Plug and Outfits.)

TIRES, CASINGS AND INNER TUBES.

Braender Rubber & Tire Co., Ruth-erford, N. J. (Braender.)

Federal Rubber Mfg. Co., Milwau-kee, Wis. (Federal.)

Goodyear Tire & Rubber Co., Madis-on St., Akron, O.

Miller Rubber Co., Akron, O. (Mil-ler.)

Polack Tyre & Rubber Co., 246 W. 59th St., New York City. (Polack.)

TOPS AND ATTACHMENTS.

Highland Body Manufacturing Co., Station P, Cincinnati, O. (High-land Coupe.)

Springfield Metal Body Co., 20 Med-ford Ave., Springfield, Mass.

TRUCKS AND TRACTORS. (See Cars, Commercial.)

UNLOADERS.

Gallon Iron Works and Mfg. Co., 116 East Main St., Gallon, O. (Gallon Eclipse Portable.)

VALVE LIFTERS AND RESEAT-ERS.

Paro, H. G., Suite 718-719 Michigan Blvd., Bldg., 30 No. Michigan Blvd., Chicago.

VALVES, TIRE.

Stevens Mfg. & Supply Co., Fisher Bldg., Chicago. (Stevens.)

VALVE TOOLS.

American Valve Tool Co., Stamford, Conn., Box 27.

VARNISHES, ETC.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

VULCANIZERS.

Mabey's Electric & Mfg. Co., Indian-apolis. (Mabey's Electric.)

Vanderpool Co., Springfield, O.

Williams Foundry & Machine Co., Akron, O.

WELDING OUTFITS.

Dyer Apparatus Co., Cambridge, Mass. (Dyer.)

Waterhouse Welding Co., 3 Pelham St., Boston, Mass.

WHEELS, WIRE.

Houk Mfg. Co., 1709 Elmwood Ave., Buffalo, N. Y. (Houk Detachable.)

WRENCHES AND COMBINATION OUTFITS.

Cora Wrench Co., Worcester, Mass.

Lane, Will B., 180 No. Dearborn St., Chicago. (Unique Ratchet.)

Mossberg Co., Frank, Attleboro, Mass.

Clean Carbon From Cylinders

COMPLETE GENERATING AND DECARBONIZING OUTFIT

\$15



Not too large for the small garage or shop, but large enough for any business a shop can do.

A complete equipment, fully guaranteed, and extremely economical to operate.

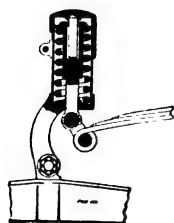
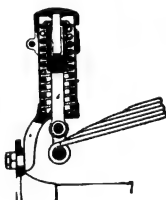
No tanks to handle, with material always ready, any person can use it and make money.

Will clean carbon from a cylinder in three minutes. Oxygen is generated in three minutes.

Saves time labor and material, and does the best work science can conceive.

"O.G." Ford Shock Absorbers \$9 THE SET OF FOUR

Can be attached in 15 minutes, are adjustable when attached, and are automatically adjusted by the load. Thoroughly lubricated by grease cups. No rattle or squeak. Sold with a guarantee for satisfaction during the use of the car, covering material, workmanship and complete absorption of shock. Purchase price refunded if not satisfactory. Method of attaching to rear spring of Ford car is shown by this illustration.



Extreme spring action with this absorber attached to the front spring is shown in this illustration of the manner of installation. The spring tension is adjusted by turning the cap, lessening or increasing the pressure.

No questions asked if refund is requested. The user is the one who must be satisfied.

Write today for Jobbers' and Dealers' Discount Sheets and Special Literature.

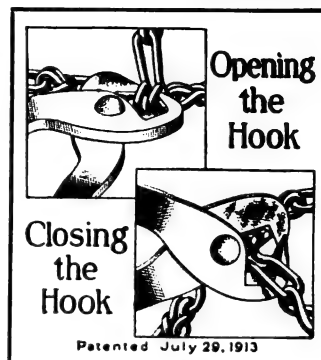
Oxygen Generator Co.
301 River Street TROY, N. Y.

WEED TIRE CHAIN PLIERS.

New Repair Tool for Circular Hooks Is Produced by the Weed Chain Tire Grip Co.

A pliers specially designed for opening and closing the circular hooks of the new type of cross chains for Weed tire chains is now manufactured

by the Weed Chain Tire Grip Company, Bridgeport, Conn., which is known as the Weed pliers. The ends of the latest types of Weed cross chains are fitted with circular hooks, and the pliers are intended to expedite the removal of these hooks when a chain is broken and must be replaced. The accompanying illustration shows the pliers with which the repair can be made in a very short time. With the flat end of the pliers the hooks can be spread, and the patented square opening in the tool is used for closing the hooks when making replacements. All users of Weed chains will find this tool especially advantageous, so that practically all motorists can be regarded as probable customers for them. Dealers who sell Weed chains can, by mentioning The Automobile Journal in their inquiry, receive detailed information direct from the company.



Patented July 29, 1913

Weed Chain Pliers.

BETHLEHEM SPARK PLUG CASE.

Silvex Company Is Providing Its Agents with a Handsome Display Cabinet Free.

The Silvex Company, New York City and South Bethlehem, Penn., is providing its agents without cost with a handsome cabinet, metal bound, constructed of board stock, in which to show a series of Bethlehem five-point plugs that are mounted



Bethlehem Spark Plug Show Case.

behind glass. The case has stock space for 48 plugs and six extra porcelain cores. Dealers should write the company for full information.

(Continued on Page 72.)

(When Writing to Advertisers, Please Mention The Automobile Journal.)



THE unvarying performance of the Zenith under every condition a carburetor is ever forced to meet has led to its adoption by over 150 of the best known makes in Europe. There are many "reasons why." Look them up in the new catalog. It's yours on request.

ZENITH CARBURETOR CO. DETROIT, MICH.

The water cure for nozzles

NOWHERE else in a motor car does the variation of a small hole mean so much as in the spraying nozzle of the carburetor. This difference cannot be easily detected by gauges. It takes the Zenith "Water Cure" to show it up. Zenith tests each nozzle by a flow of water under constant pressure which is caught in a graduated measuring tube. This is testing the nozzle under conditions very similar to actual usage. In a given time, a given size hole will give a certain amount of water. By holding the permitted variation to close limits absolute uniformity is secured. That is why all Zenith carburetors of one size are interchangeable without adjustment.



ALDING PORCELAIN PLUGS



Regular
75c Value
50c
EACH

Write for a gallon of the famous
"ALDING" Oil, in "DUCK" Can, 75c Delivered
ALSTEN & GOULDING COMPANY
36 Foster Street, Worcester, Mass.

Write for full
particulars



UPPERIOR MANUFACTURING CO.

**Why Freeze Yourself?
Ruin Your Auto?**
**The Superior
Safe Garage Heater**

**SAFE. NO FUMES.
NO GASES**

Equipped with pilot light. No
matches, no danger, no discomfort.
An ideal positive heater.

N. S. Pittsburgh, Pa.

For Perfect Control and Safe, Comfortable Driving use

Weed Anti-Skid Chains

At all Reputable Dealers

Weed Chain Tire Grip Co., Bridgeport, Conn.

The Fastest Ridding
Car in the
World
MARMON

F. E. WING
562 Commonwealth Ave.
BOSTON, MASS.

New England Dealer for

NORDYKE & MARMON CO., Indianapolis, Ind.

MARMON "41"
\$3250

132" Wheelbase

MARMON "48"
\$5000

145" Wheelbase

"Don't Gamble With Safety"

Demand the Improved, Guaranteed

S-M-C Asbestos Brake Lining

Sold by all dealers or direct by manufacturer
STAYBESTOS MFG. CO. Germantown, Philadelphia, Pa.

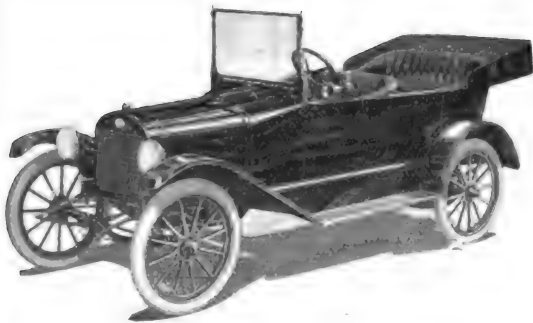
BRAENDER TIRES & TUBES



Are of the highest quality and the cheapest on
mileage. They are built to last. Send for price
list and particulars.

BRAENDER RUBBER & TIRE CO.
Main Offices and Factory, RUFHERFORD, N. J.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



METZ "25"

The Quality Car

\$600 Equipped Complete, Including Gray & Davis Electric Starter and Electric Lights.

Dealers everywhere are taking a lively interest in this latest METZ model. They realize the increasing tendency of the public to seek both **quality and completeness** of equipment in low-priced cars; and the new Metz touring car exactly meets this demand.

**We have a very attractive proposition for Dealers.
Write for particulars and new catalog "Q".**

METZ COMPANY, WALTHAM, MASS.

EISEMANN

The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.

The Eisemann Magneto Company

Sales and General Offices,
32-35d St., Brooklyn, N. Y.

New York, N. Y. Indianapolis, Ind. Detroit, Mich.
123 W. 52nd St. 415 N. Capitol Av. 802 W. 4th Av.



REXO II \$3⁸⁵

THE GARFORD MANUFACTURING COMPANY, 2506 Olive St., ELYRIA, O.

Successors to THE DEAN ELECTRIC COMPANY.

THE MOTOR TRUCK

**A Recognized Authority in the
Commercial Vehicle Field**

12 ISSUES

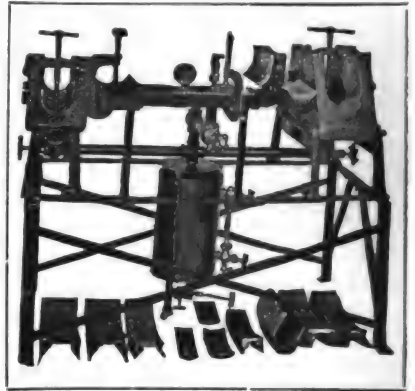
\$2.00 THE YEAR

(When Writing to Advertisers, Please Mention The Automobile Journal.)

VANDERPOOL VULCANIZING OUTFITS.

Springfield, O., Company, makes Practical Equipment for the Service Station or Repair Shop.

The Vanderpool Company, Springfield, O., is manufacturing vulcanizing outfits that can be made very profitable by those who engage in tire repairing. The Vanderpool vulcanizer is a two cavity, machine fit, with which the repairman can do any work necessary on tubes or castings quickly and with minimum labor. This outfit is simple in construction and no expense is required after the initial investment. The price of the outfit is extremely reasonable and every sale is made with an absolute guarantee of material and workmanship. The repairman who is enterprising can make large profits on a small investment. The garage or repair man who is interested in a vulcanizer that will do any work should write the company for full information and a copy of its latest catalogue, mentioning The Automobile Journal.

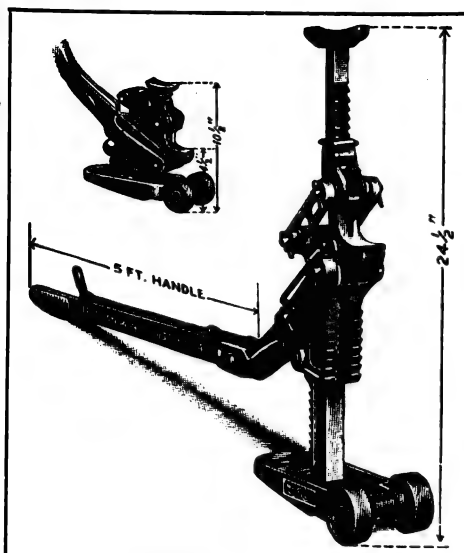


The Vanderpool Vulcanizing Outfit.

MOSCO EXCEL GARAGE JACK.

Motor Specialties Company Is Selling a Powerful Tool for Rapid and Easy Handling of Automobiles.

The Motor Specialties Company, Waltham, Mass., manufacturer of the widely known Mosco products, is selling the Excel garage jack, a heavy and powerful tool, with which large and small cars can be easily handled. This jack is specially designed for use in garages, service stations,



The Excel Jack Sold by the Motor Specialties Company.

repair shops, tire agencies, etc., and weighs 50 pounds. As may be seen from the accompanying illustration, it has a five-foot handle, which gives powerful leverage, and which will raise either end of a car 4½ inches with a single stroke. The range of lift is from five to 26 inches from the floor. The company makes liberal dis-

counts to garages and dealers. Dealers and agents interested should write for the 1915 Mosco catalogue, mentioning The Automobile Journal.

(Continued on Page 73.)

STREAMLINE HOOD FOR FORDS.

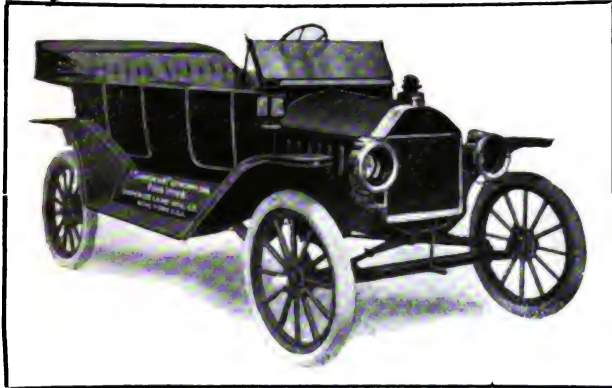
The Superior Lamp Manufacturing Company Building a New Hood That Improves Appearance of Car.

The Superior Lamp Manufacturing Company, 136 West 52nd street, New York City, is building a new Ford specialty in form of a streamline hood. This equipment



The Superior Ford Streamline Hood.

adds materially to the appearance of a Ford car and the effect is to much change it from every point of view. The Superior streamline hood is made of heavy 16-gauge pressed steel and has six ventilator gills on each side. The construction is solid and substantial, and the manufacturer states it cannot rattle or creak. The top is free of hinges, and the design is such that it effectively prevents rain or water from reaching the motor or the electric wiring. The Superior Company has an exceptionally attractive proposition for dealers to sell this



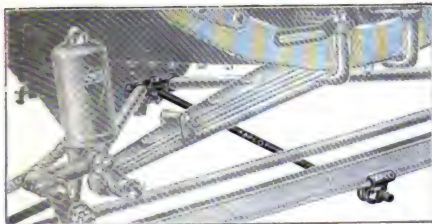
Showing How the Superior Hood Gives a Streamline Appearance to a Ford Car.

hood and will at request send a detailed statement of its special dealers' proposition.

FRONT AXLE BRACE FOR FORDS.

Auto Parts Company, Providence, R. I., Adds Useful Specialty to Its Line.

A front axle brace for Ford cars is one of the latest specialties made by the Auto Parts Company, Providence, R. I. The front radius rod has more or less give, and claim is

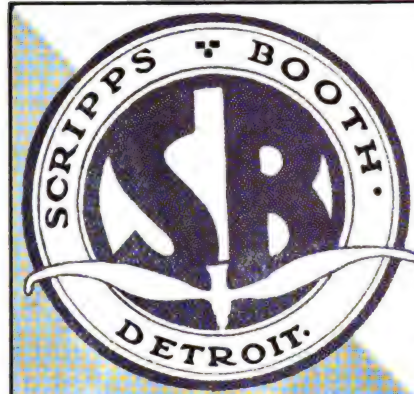


Apeo Front Axle Brace.

made that the spring of the tubing causes the front axle to tip backward, affecting the steering of the machine. The Auto Parts Company's front axle brace consists of two ingenious clamps and a steel rod. One of these clamps is attached to the V end of the radius rod by three bolts which have square heads fitting into a recess, which prevents their turning. The end of the rod has a square head. The other clamp is secured to the front axle, as shown in the accompanying illustration, and is held firmly in place by two nuts on the rod, which extends through the clamp.

(Continued on Page 77.)

(When Writing to Advertisers, Please Mention The Automobile Journal.)



**THE
LIMIT
OF
LUXURY
IN
LIGHT
WEIGHT**

SCRIPPS-BOOTH LUXURIOUS LIGHT CARS

Deliveries Now

SCRIPPS-BOOTH cars have found their logical home as companions to the highest priced limousines and touring cars.

These gems of luxury and beauty have been welcomed at first sight by people of culture and good taste.

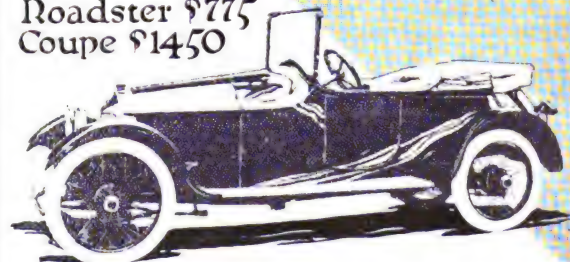
Inspection proves that never before have such luxury and beauty been offered in a light car.

Demonstration proves that there is no greater riding comfort or more satisfactory performance in any car at any price.

Scripps-Booth cars are now in the salesrooms—floormates to the highest priced cars.

SCRIPPS-BOOTH CO.
Detroit Michigan

Roadster \$775
Coupe \$1450




Price  \$1.50


**PREVENTS
RUST-CORROSION-SCALE**

NIPRUST

In Your Radiator



METAL
TURNINGS
AND
WATER



TREATED **REMOVES** NOT TREATED

Rust AND Scale

**Rust and Crust Retain Heat
USE ~~NIPRUST~~**

Opens up clogged circulation—Increases cooling efficiency and stops that expensive overheating of your motor. No Powders to Mix. No Solutions to Make. Sold in cans holding a year's supply. The Tin Can your Guarantee that it will not injure any metal surface with which it comes in contact.

*Its Merit Proven and Indorsed by
The Cleveland Auto
Radiator Co.
Manufacturers of Radiators.*

**Dealers and Agents
Wanted. Write To-Day.**

THE REFLEX
211 HIGH AVENUE
CLEVELAND, OHIO

REFLEX SPARK PLUGS

Snappy Sparking  **Heat and Oil Proof**

Reflex No. 1. Price, \$1.00; Mica, \$1.25.

POWER IN EVERY STROKE.

Maximum sparking area—360° of arcing surface. Oil, soot or carbon can't stop the gush of fat, hot sparks.

WILL NOT SHORT—CLEANS ITSELF.

At each explosion patent concave baffle on center electrode reflects all soot and dirt away from combustion chamber out thru circle spark gap.

GUARANTEED.

IGNITION COMPANY

O. A. Bergh, Los Angeles, Cal.
Jno. A. Oulver, Atlanta, Ga.
C. M. Foster, Boston, Mass.

Sales Agents:

Platen changed in an instant



Inserting The Card Platen

Because the platens are interchangeable, the same L. C. Smith & Bros. Typewriter can be used for general correspondence, heavy card or label writing and manifolding. To meet the contingencies that arise, there are the soft, medium and hard rubber platens, the card and label-writing platens, and the brass platen on which over twenty (20) carbon copies can be made. The operator can change from one to the other in a few seconds.

A new platen can be ordered by mail or express, when necessary, without losing the use of the typewriter.

ASK FOR A DEMONSTRATION

L. C. Smith & Bros. Typewriter Company

Home Office and Factory - - SYRACUSE, N. Y.

Branches in All Principal Cities

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Write today for
our Territorial Agree-
ment on the New
\$1,000
Inter-State
"FOUR"

The ONE popular priced car with
the greatest selling arguments
in the country.

INTER-STATE MOTOR CO.
804 W. Willard St.,
MUNCIE, IND.



WHY USE INFERIOR PLUGS WHEN CENTERFIRE

can be bought at the same price? They over-
come all Engine troubles, fire where others
fail and **Add Power** to engine. Any length
point desired made to order. Try them and
you will use them—always. Make a trial and
save money. \$1.00 each, 6 for \$5.00.


GUARANTEED

Agents wanted and special prices to dealers.

Milwaukee Auto Specialty Co.
705-707-709-711 Chestnut St., Milwaukee, Wis.

HAVOLINE OIL

It Makes a Difference



Manufacturer: "We have used HAVOLINE OIL with great success in our *C— Cars. What oil do you sell?"

Garage man: "Oh! That's the one oil that meets the general demand of the trade. Our customers find they get more miles per gallon from HAVOLINE than from any other oil."


Manufacturer: "Yes! and it leaves practically no carbon in the cylinders."

Garage man: "I find that practically all manufacturers advocate its use in their cars."

Manufacturer: "It certainly is well advertised. I see HAVOLINE advertisements everywhere."

*Name of car on request.

INDIAN REFINING COMPANY
17 Battery Pl., Dept L, New York



Be sure you get the oil in the Blue- and-White Can with the inner seal. We offer the garage man the best packaged goods proposition on the market. Write for our Representative or for full information. Be sure and write for the "Sales Order."

HARRIS

TRADE MARK REG. U.S. PAT. OFF.

OILS

AND

GREASES

326 S. Water St. Providence, R. I.
Branch: 143 No. Wabash Ave., Chicago, Ill.

For Your 1915 Lubricant Decide Upon

TRADE MARK  REGISTERED

NON-FLUID OIL

REDUCED PRICES (due to the perfection of new automatic machinery which reduces our cost of manufacturing) NOW enable you to use NON-FLUID OIL on your LOWEST price cars as well as your highest, at practically the same price that you are asked for greases, and the inferior substitutes that have followed in the wake of NON-FLUID OIL'S success. No matter what lubricant you have heretofore used, NON-FLUID OIL will lubricate BETTER and MORE ECONOMICALLY. Get a can now, try it on your own car and note the improvement.

"K. No. 00 Special" grade for sliding gear transmission.

"K. No. 000" for differential, compression cups and all bearings.

Sold by leading dealers everywhere. Look for the orange-colored can bearing sprocket-wheel trade-mark shown above.

**New York & New Jersey
Lubricant Co.**
165 Broadway, New York
1430 Michigan Avenue, Chicago, Ill.



J. H. S.

PATENT APPLIED FOR



J. H. S. as attached to three-quarter elliptic springs.

Backed by ten years of success in the manufacture of shock absorbers.

**Indispensable for Comfort
and Economy of Upkeep**

Price \$25.00—ANY CAR

30 Days' Free Trial—Year Guarantee

J. H. SAGER CO., 271 South Ave., Rochester, N. Y.
New England Distributor
F. SHIRLEY BOYD, 175 Massachusetts Ave., Boston, Mass.

When Writing to Advertisers, Please Mention The Automobile Journal.

FOR LUBRICATION

Polarine

the standard oil for all motors.

Feeds freely down to zero.

STANDARD OIL CO., OF NEW YORK

Principal Stations

New York
BuffaloAlbany
Boston

TRADE MARK
Raybestos
REG. U.S. PAT. OFF.

"THE ORIGINAL AND BEST ASBESTOS BRAKE LINING"

THE ROYAL EQUIPMENT CO., BRIDGEPORT, CONN.

F. SHIRLEY BOYD

175 Massachusetts Ave., Boston, Mass.

R. I. V. Ball Bearings.

Baldwin Chains and Sprockets.

J. H. Sager Line.

PAIGE "36"—\$1195
"25"—\$ 925

Leaders of popular-priced cars—thoroughly built, completely equipped, backed by a strong organization. Specifications and catalog on request.

PAIGE-DETROIT MOTOR CAR CO.
Detroit, Michigan**DIXON'S** MOTOR GRAPHITE

Send For Sample No. 210

Made in JERSEY CITY, N. J., by the
JOSEPH DIXON CRUCIBLE CO. (1)**DOVER ELECTRIC LIGHT BULB CASE**

(Pat. Applied For)

It Will Carry Extra
Bulbs Safer Than the
Ones in the Lamps of
the Car.Send for New 1914
Catalogue**DOVER**
STAMPING & MFG. CO.,
(1) Cambridge, Mass.**THE MOTOR TRUCK**A Recognized Authority in the
Commercial Vehicle Field

12 ISSUES

\$2.00 THE YEAR

Studebaker

FOUR Roadster, \$985 SIX 5-passenger Touring Car, \$1285
FOUR Touring Car, \$985 SIX 7-passenger Touring Car, \$1450
All models electrically started and lighted and completely equipped.

STUDEBAKER - DETROIT, MICH.*Mea*
MAGNETOS**S. R. O.**
BALL BEARINGS

Sole Importers

MARBURG BROS., 1790 Broadway, NEW YORK**BALL BEARINGS REGROUND**at one-fifth the cost of new, also New
Single Row Annular, Thrust, New
Departure Double Row and Radax
Bearings.**AHLBERG BEARING CO.**Boston
New YorkChicago
Los AngelesDetroit
Cleveland**VALVOLINE OIL CO.**

Heavy, Medium and Light

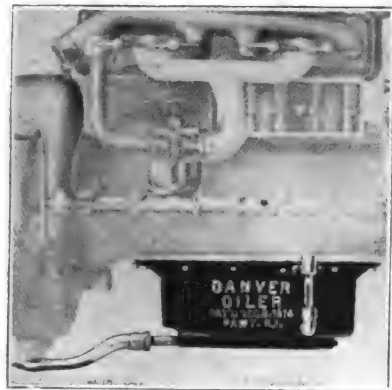
Automobile Oils**27 STATE STREET BOSTON, MASS**

(When Writing to Advertisers, Please Mention The Automobile Journal.)

NEW DACO PRICE LIST.

Danver Accessory Company Has Revised Its Discounts for 1915 for Ford Car Specialties.

The Danver Accessory Company, 18 Broadway, Pawtucket, R. I., manufacturer of the Daco specialties for Ford cars, has revised its discounts for 1915, the new prices being extremely attractive to dealers.

**Daco Oiler for Ford Cars.**

socket anti-rattler made to fit Ford cars that has a screw adjustment. The trade will be supplied with the new price list on request.

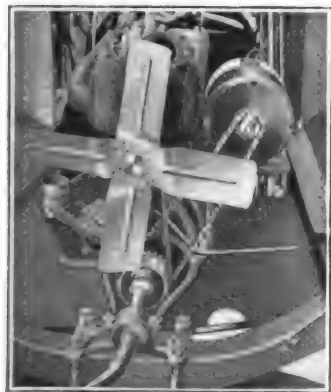
The Daco line includes the Danver automatic oiler, combination anti-rattler and grease cup, brake rod supports, etc. The large demand for Daco specialties and increased manufacturing facilities has made possible these reductions. The company points out that the Daco combination anti-rattler and grease cup is the only patented ball

AUTO PARTS CHANGES.

The Auto Parts Company, Chicago, Ill., announces that Walter J. Costello and John T. Hart have been taken into its organization. Mr. Costello is well known on Chicago's automobile row, and Mr. Hart, general manager of the Auto Parts Company, is well known to automobile men throughout the entire Middle West.

NEW-LITE LIGHTING SYSTEM.**Newton, Ia., Concern Has Attractive Offer for Dealers in High-Grade Equipment.**

The New Lite Manufacturing Company, Newton, Ia., is building a lighting equipment adopted to all types of cars and which is sold for prices that are very attractive to owners.

**New-Lite Dynamo on Ford Car.**

easily made by the owner. The lighting equipment is complete and includes a cut-out switch, storage battery, lamps and all accessories necessary for installation.

(Continued on Page 78.)

(When Writing to Advertisers, Please Mention The Automobile Journal.)



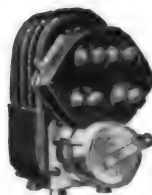
REG. U. S. PAT. OFFICE

Magneto ignition is highest grade equipment—saves you money every mile you ride and increases the efficiency of your car

SPLITDORF ELECTRICAL CO.

NEWARK, NEW JERSEY

Model
BX-4



HEINZE



HEINZE MAGNETOS have proven superior in all competitive tests. This superiority is your guarantee of **FREEDOM** from ignition troubles.

HEINZE ELECTRIC COMPANY

Sales Offices—Detroit, Michigan.

Factories—Lowell, Mass.

Service Stations—New York, Detroit, Chicago, Minneapolis

**AUTOMOBILE
ELECTRIC LIGHTING SPECIALTIES**

For the Automobile Owner and Manufacturer
who wants SERVICE for his money

ELECTRIC LIGHTING SPECIALTIES Made to Order

CULVER-STEARNS MFG. CO.

Worcester, Mass.

Detroit, Mich.

**TEXACO
MOTOR OIL**

Meet me at the
Tuller



For Value,
Service, Home
Comforts

New HOTEL TULLER

Detroit, Michigan

Center of business on Grand Circus Park. Take Woodward car
get off at Adams Avenue.

ABSOLUTELY FIREPROOF

200 Rooms, Private Bath,	\$1.50	Single,	\$2.50	Up, Double
200 " " " "	2.00	"	3.00	" "
100 " " " "	2.50	"	4.00	" "
100 " " " "	3.00 to 5.00	"	4.50	" "

Total 600 Outside Rooms. All Absolutely Quiet.
Two Floors—Agents' New Unique Cafes and
Sample Rooms Cabaret Excellent



SPEDOLENE solves the problem of automobile
and motor truck gear lubrication. One trial
is all we ask. "A fair field and no favor"
will demonstrate to your satisfaction that
SPEDOLENE is the King of all lubricants for
gears.

Henry H. Kroh, Boston Distributor,
MANUFACTURED BY
Continental Asbestos Corporation, Worcester, Mass.

MOTOR PARTS COMPANY

OFFICIAL

BOSCH DISTRIBUTOR

Zenith Carburetor Mohawk Tires Leak-Proof Rings

185-187 Columbus Avenue, BOSTON
818 No. Broad St., PHILADELPHIA SPRINGFIELD, MASS.

Peerless Quality in Smaller Size

"ALL PURPOSE" FOUR AND SIX

FOUR AT \$2,000 (Sixes \$250 Extra)

THE PEERLESS MOTOR CAR CO., CLEVELAND, OHIO

Makers also of the "48-Six" and Peerless Trucks.

Licensed under The Kardo Patents.

\$485 Salvador Car \$485

Four-Cylinder, Water-Cooled Unit Power Plant
with Three Speed Selective Transmission and Shaft
Drive. The Quality and Equipment of the High-
Priced Car at Cyclecar Price.

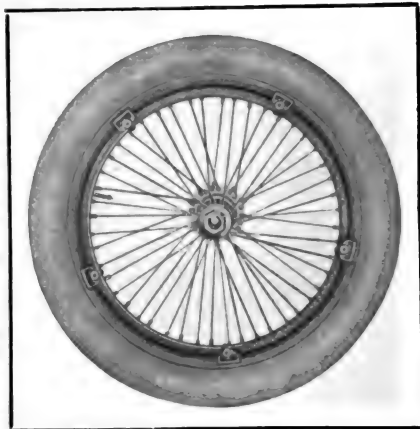
SALVADOR MOTOR CO., 126 Massachusetts Avenue
Boston, Mass.

MOTT WIRE WHEELS FOR FORDS.

Utica Company Has Excellent Proposition for Dealers
Who Want a Quick Selling Specialty.

The Mott Wheel Works, Utica, N. Y., manufacturer of
Mott wire wheels with demountable rims for Ford cars.
is making an exceptionally interesting proposition to
dealers. This

equipment re-
tails for \$35 for
a set of four
wheels and five
rims. The Mott
wheels may be
mounted on a
Ford car in a
very short time.
The change can
be made by any
owner. Mott
wheels are care-
fully designed,
built of high-
grade stock and
are fully guar-
anteed against
defective mate-
rial and faulty
workmanship.
The company
will replace free
of charge any
wheel or part which develops defects within one year
from date of purchase. A request to the company at its
Utica address will bring full information regarding the
company's agency contract.



Mott Wire Wheel for Ford Cars.

DUPLEX HAS GOOD SELLING PLAN.

Manufacturer of Four-Wheel Drive Trucks Has Exclu-
sive Territory Open for Dealers.

The Duplex-Power Car Company, Charlotte, Mich.,
manufacturer of Duplex four-wheel drive trucks of 4000
and 6000-pound capacities, has an attractive proposition
to offer live dealers who desire an agency for high-grade
trucks. Duplex machines have been subjected to every
possible test and have been proven exceptionally efficient
and enduring in every instance. An inquiry made to the
company's office will bring detailed information as to ter-
ritory open, its co-operative plan, discounts, etc.

THE NEW CARLETON GENERATOR.

A Lighting Equipment That Has a Porcupine Drive.
Which Prevents Slippage of the Belt.

The Carleton Company, 172 Summer street, Boston,
Mass., is building a generator known as No. 68, to supply
current for motor car lighting, and which may be util-

ized with or without a storage
battery. A feature of this gen-
erator is the porcupine drive,
which is claimed will prevent
belt slippage and reduces bearing
stresses to a minimum. The
Carleton generator, adaptable to
all machines, lists at \$15, and the
discounts to the trade are very
liberal. No machining or al-
terations are necessary, and the
generator can be installed with
a screw driver and a wrench.
The construction of this machine
is simple and sturdy through-
out. Full information as to
terms, sales plans and other de-
tails will be supplied upon request.
For the owner or for
the dealer this is a live, efficient
system, capable of an-
swering all purposes.



Carleton Generator.

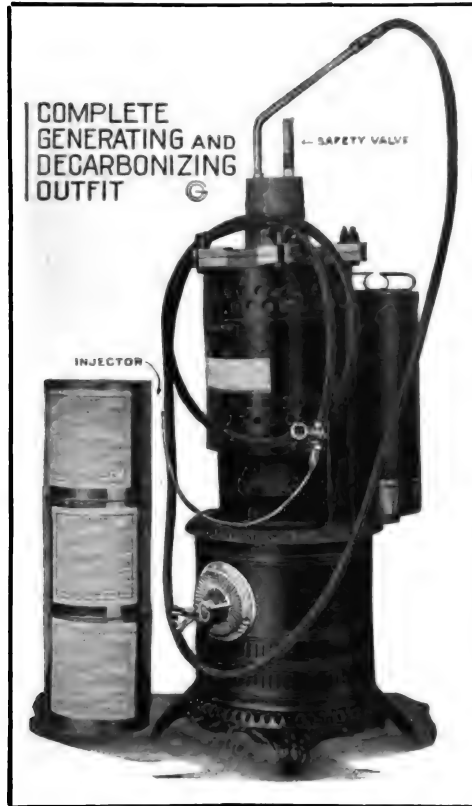
(Continued on Page 79.)

(When Writing to Advertisers, Please Mention The Automobile Journal.)

TWO QUICK SELLING ACCESSORIES.

The Oxygen Generator Company Producing Generating and Decarbonizing Outfit and O. G. Shock Absorber.

The Oxygen Generator Company, Inc., 301 River street, Troy, N. Y., is manufacturing a complete generating and decarbonizing outfit that is specially desirable



COMPLETE
GENERATING AND
DECARBONIZING
OUTFIT

SAFETY VALVE

INJECTOR

for vehicle owners and garage men. This outfit, as may be seen in an accompanying illustration, generates oxygen. By putting one four-pound can of oxygen in the generator and lighting the burner, enough oxygen can be generated in three or four minutes to clean four heavily carbonized cylinders. The apparatus is 2½ feet high and 9½ inches in diameter and is made of heavy cast iron. It will hold oxygen gas for weeks, is made exceptionally heavy and having a

The O. G. Oxygen Generating and Decarbonizing Outfit.

safety valve it cannot explode. The O. G. shock absorber has an extreme spring action and absorbs both shock and the rebound. The generating and decarbonizing outfit is sold for \$15 complete, this including three four-pound cans of oxygen. The O. G. shock absorbers are offered for \$5 for the set of two or \$9 for the set of four. The company will state the details of prices and discounts and will supply literature at request.

BIG DEALERS' OPPORTUNITY.

Cotton Company's Complete Line of Bodies for Ford Cars Meet a Very Large Demand.

The dealer who desires to sell automobile bodies, including a type designed for Ford chassis, will be much interested in the product of L. M. Cotton, Inc., 922 Commonwealth avenue, Boston, Mass., which has exceptional qualities and large opportunity for sales. The Cotton Company will exhibit a series of its bodies at the Boston automobile show and will occupy spaces 331, 332, 333 and 334 in the basement. This company is building a Ford limousine body that dealers should find an excellent seller. The margin of profit on Cotton bodies is exceptionally liberal, and details of the company's sales proposition can be obtained by writing the company or visiting the company's booth during the show.

15% SAVED

By A

Pyrene
TRADE MARK.
FIRE
EXTINGUISHER

IN YOUR CAR

Automobile fire insurance policies are issued at 15 per cent, less than the standard rates when the owner has provided a PYRENE FIRE EXTINGUISHER.

This equipment is approved as the best protection you can have for your machine, it is a means of direct economy, and it safeguards other property.

PYRENE FIRE EXTINGUISHERS

will serve you for a long period, are always effective, can be carried conveniently in any car and are instantly available when needed.

Pyrene Brass and Nickel Plated Fire Extinguishers, one-quart capacity, are included in the lists of approved fire appliances issued by the National Board of Fire Underwriters.

PYRENE COMPANY of NEW ENGLAND

88 Broad Street, Boston, Mass.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

We still think

that hand signals are makeshifts; that car owners will be far better satisfied from every standpoint with motor-driven Klaxons.

but there are some car owners who still want hand signals and want them at a low price.

therefore we have decided to bring out the



Hand Klaxonet

Klaxon Permanent Guarantee; Klaxon Quality; Klaxon Note; Brass projector (not steel); Oval bell. Finished in black and nickel, black and brass, all black.

LOVELL-McCONNELL MFG. COMPANY
MAKERS OF THE "KLAXON" NEWARK·N·J.

\$4

Deliveries May 1st

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Our business for the week ending February 6 was the largest up to that time. The following week was still larger.

Unfilled orders were 26% greater than at the same time a year ago.

This, better than anything else, must prove to dealers that the Overland is a profitable car to handle.

Handsome catalogue on request. Please address Dept. 52.

"Made in U. S. A."

The Willys-Overland Company, Toledo, Ohio.

There's no leak proof ring but the **LEAK-PROOF** Ring — insist



When You Have Your Car Overhauled

Don't Forget to Have the Piston Rings Examined!

¶All the overhauling in the world won't bring the power of your car back to proper standard if the piston rings in the motor are faulty and are allowed to remain so.

¶Why pay for overhauling unless you really remove the cause of power loss? Poor compression—fuel waste—carbon trouble and excessive motor wear will only persist and increase, because all such conditions are due to inefficient piston ring service, and replacement is the only way to correct them.

¶Even if they haven't yet occurred, they are inevitable if one-piece, unequal-bearing piston rings are installed in your motor. Now, when your engine is down, is the time to save yourself from trouble in the near future.

¶Tell the repair man to put in

MADE IN
ALL SIZES

LEAK-PROOF

EASILY
ADJUSTED

Piston Rings

MADE BY McQUAY-NORRIS MFG. CO.

The mechanically perfect, permanently efficient piston ring. Their use will insure you:—

FULL MOTOR POWER—Because, being two-piece, they have no unsealed openings. The halves are interlocking and concentric with opposed points of expansion, so that tension on the cylinder wall is always uniform. This results in perfect compression.

SERVICE—Because they are made of special Processed Gray Iron of wonderful toughness, that never loses its elasticity and will outlast the motor.

MINIMUM CARBONIZATION—Because surplus oil cannot get up into the combustion chamber and cause carbon deposit.

STRENGTH—Because of construction on the angle-iron principle which gives them the greatest strength.

OPERATING ECONOMY—Because they make every drop of fuel count and check waste of lubricating oil.

MAINTENANCE ECONOMY—Because they do not wear or mar the roundness of the cylinder and prevent the deterioration of lubricating oil.

Send for FREE Book—"To Have and to Hold Power"

It explains the theory and function of piston rings. It tells about the **Leak-Proof** RING and why every motor should be equipped with them. How it will pay you in fuel economy and prolonged motor life. Write for it.

"Ask the User"

In Use on
Over 300,000 Automobiles
and Motor Boats



Piston Rings
Manufactured by

Sold by all up-to-date
dealers, garages, repair shops
and marine stores

McQUAY-NORRIS MANUFACTURING CO., Dep't D, St. Louis, Mo.

Canadian Factory—W. H. Banfield & Sons, No. 120 Adelaide Street West, Toronto.

BRANCH OFFICES

New York—1919-29 Broadway at 64th St.
Pittsburg—7620 Toga St.
Kansas City—513 New Nelson Bldg.

Chicago—Suite 718 Michigan Blvd. Bldg.
Michigan Ave. and Washington St.

San Francisco—164 Hansford Bldg.
Los Angeles—224 Central Bldg.
Dallas—1509 Commerce St.

VOL. XXXIX.

NO. 4.

AUTOMOBILE JOURNAL

\$1.50 the year
10 cents the copy

PAWTUCKET R.I.

March 25, 1915



V. C. Prices Reduced
Substantially—
V. C. Quality
More Generous
Than Ever.

PENNSYLVANIA *Oilproof* VACUUM CUP TIRES

—at the substantially reduced prices now prevailing—are actually 50% better than the 1914 models. They are 50% higher in quality, in strength, in wear resistance.

They warrant an expectation of service almost twice as great as that given by those truly remarkable tires which in 1914 received from the A. C. of A. the

famous 6,760 Average Mileage Certificate.

The added quality was achieved through years of successful research toward that end.

The downward tendency of price is possible because of tremendous increase in volume and great savings in cost, at our new three-quarter million dollar plant.

So that our distributors are meeting the present conditions of the tire market with Vacuum Cup Tires higher than ever in quality—at prices formerly asked for ordinary casings.

PENNSYLVANIA RUBBER COMPANY, JEANNETTE, PA.

BOSTON: 735 Boylston Street

NEW YORK: 1889 Broadway

OFFICES IN ALL PRINCIPAL CITIES

An Independent Company With An Independent Selling Policy

The Force of a Selling Point is found in its truth and in its appeal to common sense.

*Raybestos
the product
of brake
specialists*

When we tell you that *no other concern in this country making brake lining ever has designed, developed or manufactured automobile brakes or brake mechanisms—it is true.*

Fifteen years as designers and manufacturers of automobile brakes and brake mechanisms is the practical training which has enabled us to put the best in

TRADE MARK
Raybestos
REG. U.S. PAT. OFF.

so that your customers will get the best out of it.

*Distributed by wholesale jobbers in
every large city—sold by leading
dealers everywhere.*

The Royal Equipment Company
1378 Bostwick Avenue, Bridgeport, Conn.



Nassau Tires

have set a new standard of service so far ahead of that established by the average tire, that we have coined a new phrase to describe it—**"QUALITY PLUS."**

QUALITY PLUS is no meaningless phrase—it is what enabled **NASSAU TIRES** to establish the following record of victories:

Ralph De Palma won both the Elgin and Cobe trophies at Elgin, Ill., last August, and broke the world's 100-mile record at Brighton Beach last September, all on NASSAU TIRES.

Last season Bob Burman in a PEUGEOT at different times lowered all the world's records from 10 to 100 miles on NASSAU TIRES.

And just a short time ago, Dario Resta, driving a PEUGEOT, not only won the Grand Prix on NASSAU TIRES, but eight days later—driving the same car—equipped with the SAME IDENTICAL TIRES HE USED IN THE GRAND PRIX, won the Vanderbilt, and the tires are still good for hard racing service.

When such famous drivers select NASSAU TIRES to carry them through such gruelling contests as these, the **QUALITY PLUS** which enabled NASSAU TIRES to stand this punishment should guide you in your selection.

Exclusive and protected territory to dealers.

THERMOID RUBBER CO., Factory and Main Office
TRENTON, N. J.

BRANCHES: Chicago New York Philadelphia London
Detroit Indianapolis Berlin San Francisco
St. Louis Pittsburgh Paris



The four most famous racing trophies were won on NASSAU TIRES.

- (1) Grand Prix Trophy
- (2) Cobe Trophy
- (3) Vanderbilt Cup
- (4) Elgin National Trophy



(When Writing to Advertisers, Please Mention The Automobile Journal.)



Wrenches Are Made Right, Stay Right,
Last a Lifetime, and are 30% Stronger
Than Any Other.

"COES" on any Wrench Means Quality,
Best Material and Finest Workmanship.
An Inspected and Tested Wrench. The
Ironclad "COES" Guarantee for Strength
and Finish.

The "COES" Automobile Model are for Motorists
and Repairmen. For Service Specify "COES" No
Tool Kit or Repairshop is Complete Without One.

Ease of Handling Without Fear of Slipping or Bruis-
ing. Perfect Balance and Certain Grip has made the
"COES" the Most Widely Used Tool of the Kind in
the World.

COES WRENCH CO.

WORCESTER MASS.

J.C. McCARTY & CO.

JOHN H. GRAHAM & CO.

29 Murray St. New York City

113 Chambers St. New York City

When Writing to Advertisers, Please Mention The Automobile Journal.



BOSCH WINS As Usual

Grand Prize Race

Another Bosch Magneto Victory

- 1 Resta---Peugeot---Bosch Magneto (foreign plugs)
- 2 Wilcox----Stutz----Bosch Magneto and Plugs
- 3 Hughes----Ono----Bosch Magneto and Plugs

VANDERBILT CUP

Another Bosch Magneto Victory

- 1 Resta---Peugeot---Bosch Magneto (foreign plugs)
- 2 Wilcox----Stutz----Bosch Magneto and Plugs
- 3 Pullen---Mercer---Bosch Magneto and Plugs

All of the cars to finish used

BOSCH MAGNETOS

There's a garage in your town that'll make your car Bosch-Equipt.

BE SATISFIED | *No one ignition system is used as universally as the Bosch Magneto* | SPECIFY BOSCH

BOSCH MAGNETO CO., 204 West 46th St., New York

Chicago—Detroit—Over 250 Service Stations—San Francisco—Toronto

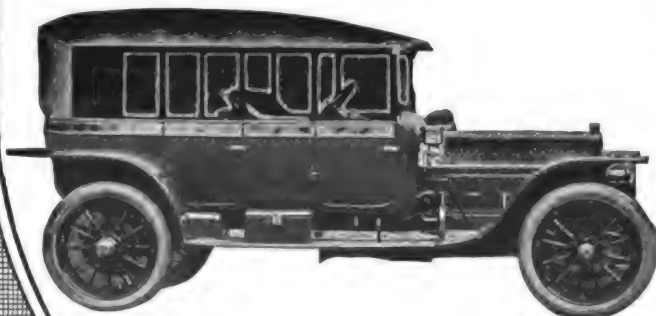
(When Writing to Advertisers, Please Mention The Automobile Journal.)

The comfort of every car body combined. An instantaneously convertible equipment that affords a touring body or a limousine whenever desired.



Changes can be made on the road as readily as in the garage. No matter what the occasion or requirement, your car with the

SPRINGFIELD CONVERTIBLE BODY is always ready and always has



the accommodation and protection you desire.

Can be raised or lowered

as easily as folding top.

SPRINGFIELD METAL BODY CO.

SPRINGFIELD

MASS.

When Writing to Advertisers, Please Mention The Automobile Journal.

TEXACO MOTOR OIL

Holder of A.P.B.A. Gold Challenge Cup Thanks Texaco Motor Oil

THE Gold Challenge Cup awarded each year by the American Power Boat Association, is considered the most important trophy of its kind in this country. Never before have there been so many fast boats brought together as in the last annual race on Lake George. Mrs. Paula H. Blackton's *Baby Speed Demon* was the winner.

In acknowledging the co-operation of those who had helped her win, Mrs. Blackton said:—

"The Texas Company looked after my interest so well and had a great deal to do in preventing the engine from making a single miss during all the hundred miles which she covered in the three races.

Whether it's for your car, your boat or your aeroplane, you'll find that Texaco Motor Oil will make your motor

deliver the maximum power. It saves gasoline, does not deposit a hard carbon crust and has an unusually low cold test. Try a can. Sold at good garages everywhere.

THE
TEXAS COMPANY
17 Battery Place, N. Y.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Index to Advertisers.

Page	Page
Ahlberg Bearing Co.....77	Standard Woven Fabric Co.... Cover
Alsten & Goulding Co.....76	Staybestos Mfg. Co., The.....78
Barrett Manufacturing Co.....75	Stevens & Co.....79
Bosch Magneto Co.....3	Stutz Motor Car Co.....72
Boyd, F. Shirley.....77	Superior Mfg. Co.....76
Braender Rubber & Tire Co....76	Texas Oil Co., The.....5
Coes Wrench Co.....2	Tuller Hotel.....79
Continental Asbestos Corp....79	Thermoid Rubber Co.....1
Culver Stearns Co.....75	Times Square Automobile Co.. 6
Dixon Crucible Co., Jos.....77	Valvoline Oil Co.....77
Dover Stamping & Mfg. Co..77	Vanderpool Company, The.... 6
Eagle Oil & Supply Co.....6	Weed Chain Tire Grip Co....12
Eisemann Magneto Co.....73	Zenith Carburetor Co.....76
Garford Mfg. Co.....73	
Goodyear Tire & Rubber Co....72	
Harris Oil Co., A. W.....76	
Heinze Electric Co.....75	
Hotel New Amsterdam.....78	
Hotel Tuller.....79	
Inter-State Motor Co.....78	
Jeffery Motor Car Co.....9	
Lovell-McConnell Co.....80	
Marburg Bros.....77	
Mayo Mfg. Co.....75	
Mea Magneto Co.....77	
Metz Company.....73	
Miller Rubber Co.....77	
Motor Parts Co.....79	
New Amsterdam Hotel.....78	
New Departure Mfg. Co.....7	
Nordyke & Marmon.....76	
N. Y. & N. J. Lubricant Co..74	
Oxygen Generator Co.....71	
Palge Detroit Motor Car Co..76	
Peerless Motor Car Co.....79	
Pennsylvania Rubber Co..Cover	
Pierce-Arrow Motor Car Co.... Cover	
Pyrene Co. of N. E.....74	
Royal Equipment Co.....Cover	
Sager Co., J. H.....78	
Salvador Motor Co., The.....79	
Scripps-Booth Co., The.....73	
Splitdorf Electric Co.....75	
Springfield Body Co.....4	
Standard Oil Co.....72	

FOR SALE.

**Shop Vulcanizer, Bargain.
Vanderpool, Springfield, O.**

We sell everything pertaining to the automobile at half regular prices. Send for our great "PRICE WRECKER" No. 5, containing 3000 auto bargains at cut prices. TIMES SQUARE AUTOMOBILE Co. World's largest dealers. S. W. Cor. 56th St. and Broadway, N. Y. 1210 Michigan Avenue, Chicago.

Accessory and Garage Journal

A Distinct Trade Publication

Guaranteed to Have an Exclusive
Trade Reader Distribution of

20,000 Copies

Each Monthly Issue

**Without a Competitor
in Its Field**

Detailed Advertising Information
at Request

**Accessory and Garage Journal
Times Building, Pawtucket, R. I.**

IMITATED
BUT NOT
DUPLICATED

**EAGLE
NO-KARBON
OIL**

THE OIL THAT SUITS
AND DOES NOT SOOT.

Carbon in your cylinders means loss of power. Customers report 10,000 to 15,000 miles with no carbon troubles. A good motto: TRY ANYTHING ONCE. EAGLEINE NO-KARBON AUTO OIL is furnished in 1-5-10 gallon, 30 and 50 gallon Steel Drums with faucets for which no extra charge is made.

**EAGLE OIL
AND SUPPLY CO.**

104 BROAD STREET, BOSTON, MASS.

NEW DEPARTURE BALL BEARINGS

American Made for American Trade

Quality and Reliability
are alone responsible for
their steadily increasing
use in American made
motor cars.



The New Departure Mfg. Co.

Bristol, Conn., U. S. A.

Distributors in Trade Centers Throughout the United States

Western Branch: 1016-17 Ford Bldg. Detroit, Mich.



(When Writing to Advertisers, Please Mention The Automobile Journal.)

PUBLISHER'S AND READER'S PAGE.

FORD car owners will find in the department devoted to Ford cars some extremely interesting information relative to operation, maintenance and repair, specially prepared for their benefit. In this department is included illustrations and descriptions of all that is new in Ford accessories, equipment and supplies, to which the reader's attention is especially directed.

The New Owners' Department is to be inaugurated with the April 10 issue of The Automobile Journal. As the title implies, this will be given over to facts that will be useful to those who are using their first car, and who are anxious to obtain practical knowledge that will serve them in operating, maintaining and adjusting their machines. This section will deal with conditions usually met with in all standard types of vehicles. Much care will be taken to make this department valuable to all readers. It will contain many features of special interest.

Touring information which has been a feature of the issues of Automobile Journal in previous years, will receive more attention this coming season than ever before and in addition to the Annual Touring Number, which will be the largest and most comprehensive edition of the kind ever published, each issue will be replete with data relative to all sections of the country. The information that will be presented will be the most dependable that can be obtained from the best authorities. The resources of the touring information department of The Automobile Journal are always at the command of its readers.

"Jitney" Car Service has become a state, municipal, industrial and economic problem. The leading article of this issue is devoted to consideration of the "Jitney"

Service as It is Today," dealing with conditions that obtain generally throughout the country. This is to be followed by other articles which will survey the "Jitney" from other aspects, and which will be of extreme interest, not only to the motor vehicle industry, but to corporate, legislative and civic bodies. The consideration of the "Jitney" service as a business proposition will also be exhaustively undertaken in the issues of the MOTOR TRUCK, and the survey will be reflected in the pages of this magazine. The information that will be presented in both publications will be of extreme value to all persons, whether or not motorists.

Motor vehicle owners who have mechanical knowledge, not necessarily technical, of automobile cars, wagons or trucks, can materially increase their own satisfaction and decidedly lessen the cost of operation and maintenance of their machines. This can only be obtained by experience, or by learning the experience of others. No information available can be compared with the series of mechanical books published by this company. While they are devoid of technicalities, they deal with every subject involving a car or a truck, considering every standard type and recognized construction, so that the reader can take up precisely what he has for components or equipment instead of the mere application of principles. These publications are used as text books in a large number of schools and colleges, and are regarded as being the best works written treating of motor vehicles. The series covers every subject. Each book is splendidly illustrated, is annually revised and brought up to the minute, and is indexed and cross-indexed.

The series or the works separately can be obtained by addressing this company. Detailed information covering the series will be sent to inquirers.

Partial Table of Contents.

	Page
*Jitney Service As It Is Today.....	13
*Touring Through Colorado.....	21
*Car Accessories and Equipments.....	26
*General News of the Industry.....	31
*Dixie Highway Plans Progressing.....	35
*Knox Four-Wheel Tractor.....	38
Fighting Registration Bill.....	40
*Refinements of Marmon New Model....	41
*Federal Heavy Duty Trucks.....	44
*Maxwell Car Wins at Venice.....	45
American and European Racing Records.	46
*Three Tiffin Truck Models.....	48
Editorials	50
*Two Allen Chassis and Five Body Types.	51
*Pierce Speed Controllers.....	55
*Eclipse Portable Unloader.....	57
*Practical Motor Car Repairs.....	59
Ford Car Section Announcement.....	65
*Suggestions for the New Car Owner....	66

*Indicates article is illustrated.

SUBSCRIPTION BLANK.

Date _____

AUTOMOBILE JOURNAL PUBLISHING CO.,

TIMES BUILDING, PAWTUCKET, R. I.

Enter Order for the Following Publications:

(Designate by marking X in Space at Left of Titles)

—The Automobile Journal (Subscription, one year)..... ☐ \$1.50
 —The Motor Truck (Subscription, one year)..... ☐ \$2.00
 —The Accessory and Garage Journal (Subscription, one year).... ☐ \$2.00

Make Remittances by Check, Bank Draft, Postoffice or Express Money Order or Stamps. All Money Enclosures Are at SENDER'S RISK.

Name _____

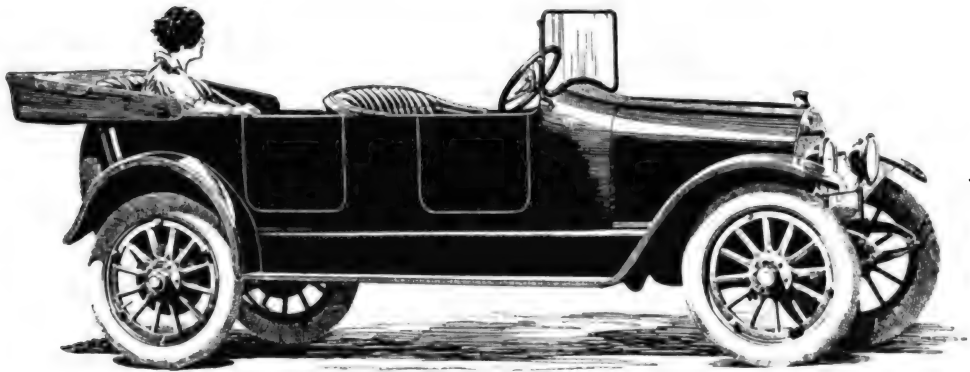
Street _____

City or Town _____

County _____

State _____

Enter Price for Each Book Ordered



Quality

Where others leave off Jeffery begins. Compared with other cars of the same price class using materials and equipment that are "good enough," Jeffery pays the additional cost for the best.

Motor starter—\$35 more on the Sixes.

\$90 more on the Light Four.

Ignition—\$15 more for Bosch.

Transmission—\$35 more for four speeds.

Tops—\$10 more for finish and materials.

Upholstery—\$25 more for quality, leather and real curled hair.

Worm drive—\$50 more for the most advanced design.

These are only a few points. They apply in equal proportion throughout Jeffery construction.

In quality, beauty, workmanship, comfort and economy Jeffery leads.

The Thomas B. Jeffery Company
Main Office and Works, Kenosha, Wisconsin

(When Writing to Advertisers, Please Mention The Automobile Journal.)

The A. J. Automobile Library

(Including All of the Famous A. B. C. Books)

**A Complete Library of
Automobile Mechanics \$4.75**

Transportation Charges Prepaid

Distinct Books—1000 Pages of Text—All Copies Indexed—2000 Illustrations,
Including Practical Working Page Charts and Trouble Finders.

Books written by recognized authorities. Especially prepared for those
who have to do with the sale, care, repair and operation of motor vehicles,
their parts, equipment, accessories, etc.

The practical information in these works cannot be secured through any other
series or number of books or for 50 times what is charged for this library.



Engine . . .	35c	Chassis . . .	25c
Magneto . . .	35c	Lighting . . .	50c
Carburetor . . .	35c	Operation . . .	50c
Battery . . .	35c	Overhauling . . .	50c
Tires . . .	25c	Motorcycle . . .	35c

Truck Operation \$1.00

Automobile Journal Publishing Company

Times Building

Pawtucket, R. I.

*A Few Words
About Trade
Advertising.*

A trade directory has features that commend it, but the Accessory and Garage Journal is more efficient in service. It reaches every manufacturer, sales agent, jobbing house, agent, representative, dealer and sales force 12 times a year, and is read each month by several, sometimes many, with each concern. Copy can be changed each month—trade directories are issued annually or quarterly.

The monthly circulation means eight times more distribution and if each copy is read by three persons—a low estimate—the aggregate is 24 times the total for the directory. But the trade directory is not read with care—it is referred to occasionally and the number of readers is not dependable. In this publication we give you free the best trade directory service known and the circulation of 20,000 a month is guaranteed.

Compare the service and cost of the Accessory and Garage Journal with any other form of trade publicity—then back this with our absolute guarantee as to what we accord advertisers in this magazine, the only straight Automobile Trade Paper published.

All Garages.

All Repair Shops.

All Dealers in Vehicles.

**All Dealers in Supplies, Fittings
and Accessories.**

**All Jobbers in Supplies, Fittings
and Accessories.**

**All Pleasure and Commercial
Vehicle Makers.**

**All Manufacturers in the Automobile
and Allied Industries.**

WRITE FOR PROOF

Accessory and Garage Journal

Times Building,

Pawtucket, R. I.

**100 Per Cent.
Quality and
Quantity
Circulation.**



Living it over Again

In a mental picture, he reviews the accident—the result of his recklessness

He realizes too late that it is *always foolhardy* to motor on slippery roads and streets without equipping all four tires with

Weed Anti-Skid Chains

The Only Real Safeguard Against Skidding

Strange, is it not, that some men laugh at peril—they do not seek to avoid danger—and they have no fear because they have no prudence.

They continue to motor over sleety, icy, or wet roads and pavements with "Foolish Dependence Upon Bare Rubber Alone" until a false turn—a sudden meeting at a corner—a slip or a skid—brings disaster as the punishment for their imprudence.

You motorists with reasoning brains put on your Tire Chains at the first indication of slippery streets, and the editors of the daily

newspapers are urging all motorists to follow your example.

For instance, the Public Ledger of Philadelphia, Pa., published by the owners of The Saturday Evening Post, in an editorial on August 1st, 1914, said that the simple adjuration to "Use Tire Chains on wet and slippery pavements" deserved to find its way into a law, and that law should by all means be enforced.

Promote "Safety First" in YOUR motoring circle—insist that everyone use Weed Chains on ALL tires.

Weed Chain Tire Grip Co., Bridgeport, Conn.

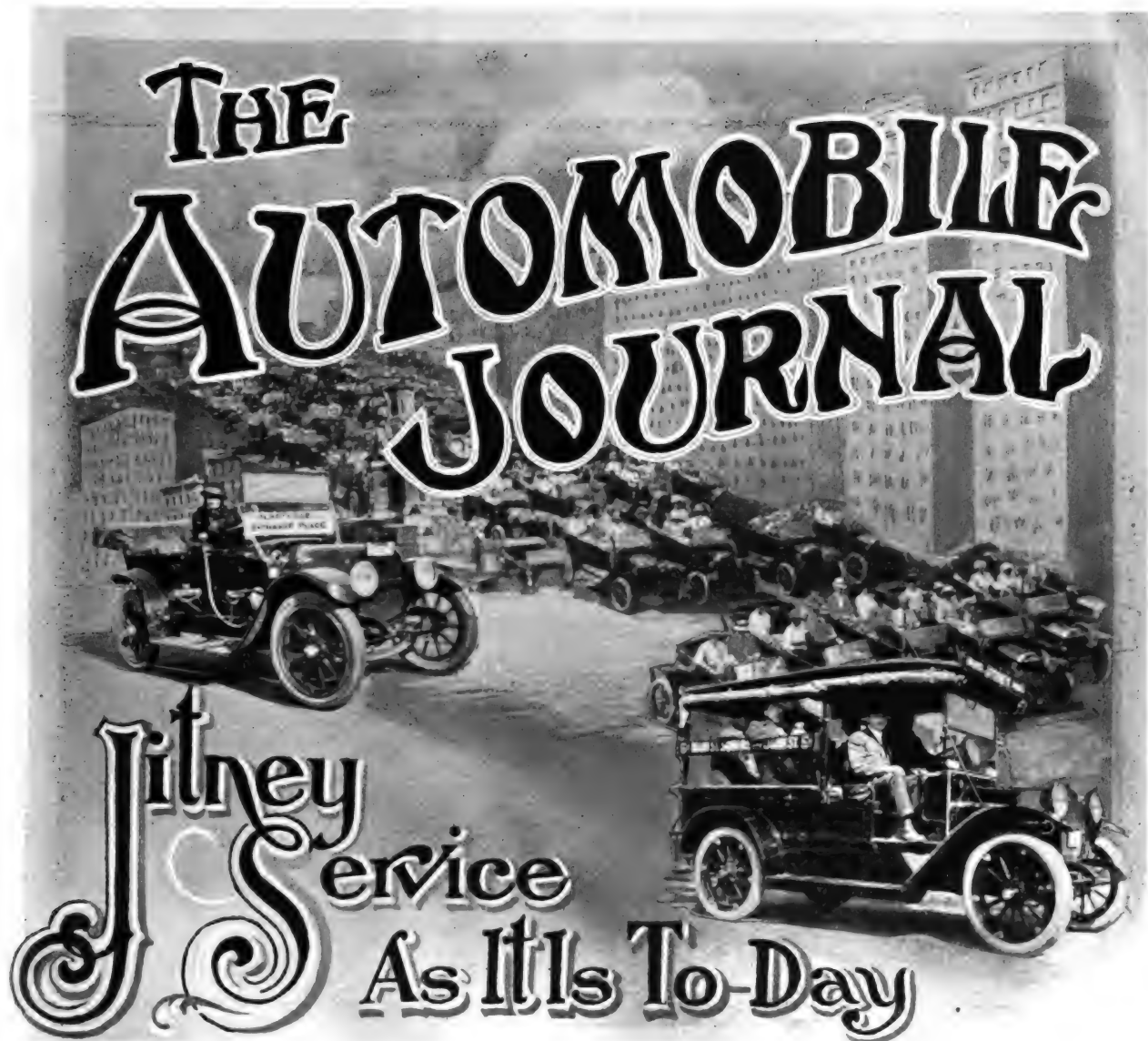
Also Manufacturers of Tire Chains and Lyon Grips especially constructed for Single and Dual Solid Truck Tires—Motorcycle Tire Chains, etc.

Manufactured for Canada by

DOMINION CHAIN COMPANY, Limited—Head Office: Shaughnessy Bldg., Montreal, Can.



When Writing to Advertisers, Please Mention The Automobile Journal.



THROUGHOUT the United States there is hardly a city or town that has not what is designated as a "jitney" service, the vehicles being pleasure automobiles, with rare exceptions light types, and driven by the owner. The "jitney" driver usually selects the route on which he will operate, and he drives over this as frequently as patronage or conditions justify during the hours that he can or is willing to work.

The "jitney 'bus" so-called, has met the popular approval because the fare is no more than is charged for transportation on the trolley

cars, because the passengers have the satisfaction of riding in a motor car, a privilege previously unknown to millions, and because of the assumption of a considerable proportion of those who patronize them that they are depriving street railroads of fares because of ingrowing thoughts that corporations are generally predatory and can only be personally dealt with.

Whatever the reasons for the existence of "jitney" services may be there is no doubt that the "jitney" has become in a very brief period a decidedly important factor in states and municipalities, and that it has become a problem that

will require careful thought and investigation no one will deny.

The purpose of the present article is to deal with the "jitney" as it is today, in which will be presented facts relative to conditions that generally obtain wherever "jitneys" are operated, and this will be followed by others that will consider the "jitney" service as a business proposition, and surveying it from the viewpoint of the motor vehicle industry.

Originated in the West.

Contrary to the usual progress of civilization the service of the "jitney," as the motor vehicles used in this class of public transportation are known, originated in the West and spread to the East. The supposition might be that discussion of the subject ought to be based on information

The magnitude of the "jitney" service, regarding it from a national aspect, is enormous, even assuming, of course, that the conditions with reference to other cities are by no means as pronounced as they are in Rhode Island. It is already a civic and economic problem, and it must be dealt with as a proposition in which the people have large interests,—interests that are extremely far reaching when careful analysis is made.

Why Rhode Island has been made the subject of this discussion, and the mushroom-like growth of the "jitney" service in the cities named has been stated, but while the people have had these additional transportation facilities and have patronized the operators of them to such an extent as to encourage many to engage in business, they



Three General Views, Showing How the "Jitneys" are Operated in Competition with the Traction Lines.

obtained in the West, where the experience had been longest. But there is no reason to believe that the conditions in any section of the country have paralleled those in Rhode Island, where the number of machines in the cities of Providence, Pawtucket,

Central Falls and Cranston, and the adjacent suburbs, in which there is a population of approximately 400,000, is remarkably large.

For this reason the section that will be dealt with in this article is that in which in a period of less than seven weeks more than 626 different vehicles have been licensed to carry passengers, and there are parts of the days when some of the streets are very largely given over to "jitney" vehicles. The first "jitney" license was issued in Providence February 8, and the first license in Pawtucket February 19, and at the time this article is written the total number of licenses issued in each municipality is 507 and 119 respectively.

are for the time being satisfied with conditions that would hardly be tolerated were they to be continued.

Rhode Island has more motor vehicles in use on its streets and highways than any other portion of the country in proportion to its population. The ratio of automobile cars, wagons and trucks is approximately one to every 36 inhabitants, and because of the unusually large number owned there is a greater ratio of owners inclined to operate them where there is seemingly opportunity to earn money. With about 16,000 machines in the state and assuming that there are 675 "jitney" cars in use, this indicates that about one of every 25 owners has engaged in this business either a part or a whole of the time. This estimate is very close to the actual figures.

During the period of seven weeks that these details cover the weather has not been such as would encourage riding for more than conven-

ience, and generally the routes traversed by the "jitney" operators are comparatively short. Probably the majority of them will average less than



One of the Few Larger Jitneys in Providence, a 1912 Garford.

two miles. Very few operators serve the suburbs because of the distances, and a majority of them drive from the civic centres through streets on which trolley lines are operated by the Rhode Island Company.

Service Is Not Organized.

As might be assumed, the service is chaotic in the sense that it is not organized, the drivers have no regular schedules, and they depend upon patronage attracted by the signs as they are standing or passing through the streets. The street traffic, and the thoroughfares in the business sections of the cities are generally narrow, is congested during the hours when the travel is heaviest, and some parts of the cities where the trolley terminals or "loops" are located are the favored "hunting grounds" of the "jitney" drivers.

While there are state laws and city ordinances relating to the regulation of highway traffic, no legislator ever anticipated the "jitney," and this means that conditions exist that have thus far been tolerated by a public that is seemingly very indulgent so far as the drivers are concerned, but which has already demonstrated to the municipal and state officials that there must be special attention directed toward the control of the machines.

With reference to these factors, there is rea-

son to believe that experiences are much the same here as elsewhere, aside from the unprecedented number of people engaged in the business, and anticipating the needs by precedents with other transportation facilities already measures are pending in the state legislature and the city councils that are intended to regulate the use of automobiles that are engaged in passenger traffic, aside from those licensed as taxicabs.

The attitude of the Rhode Island people toward the "jitney" car has been more than tolerance, if not favoritism, this being due to the fact that in Rhode Island the people have been generally antagonistic to the New Haven railroad, which has controlled the system of street car lines operated by the Rhode Island Company, and that prior to acquisition by the railroad the trolleys were dominated by a group of Pennsylvania capitalists, who were willing to disregard local public opinion. This antipathy to the railroad company has been manifested in many ways and yet the company was willing that this feeling should exist, in fact it seemingly invited it by absolute indifference to demands for service that would equal the average afforded to other cities by public service corporations.

Conditions Much the Same Elsewhere.

The conditions that have been stated with reference to Rhode Island apply to different states and communities throughout the country, and without exception the absence of laws and ordinances by which they can be regulated has been a sufficient reason for state and municipal officials to suggest or have in preparation meas-



Westminster and Dorrance Streets, Providence, Where 4000 "Jitneys" Pass Daily.

ures that are intended to control the operation of machines when using the streets and highways for passenger transportation.

The wave of "jitneyism" that has swept across the country from West to East has resulted in the establishment of services which are usually created to meet the judgment of the operators or owners as to what will be to them the most productive, and the direct benefit of the people, so far as systematic development is concerned has been entirely neglected. From one point of view the policy has been to appeal to the people as competitors of the street railroads, and this has precipitated a situation that is peculiar to each community, and to which a general policy can be well applied.

When Regulation Has Been Tried.

The statement is made that the largest number of "jitney" cars operated in any one city is in Los Angeles, Calif., where more than 1000

is usually limited as to speed between stopping places and must be operated to meet the convenience of all the passengers carried. The "jitney" car can be driven to the speed that is permitted by state or municipal regulation and can carry its freight in much less time than the trolley cars. Not only this, the drivers are privileged to stop where they please along the routes. These are really important factors, especially with those who believe that quick transportation directly benefits them, and undeniably influence patronage.

Where Trolleys Cannot Equal Service.

This possibility of rapid transit cannot be met by the trolley companies, which for obvious reasons must establish and maintain schedules for operating cars, and which must of necessity



"Jitney Square" in Providence, R. I., Where the Trolleys Are Ignored for the Latest Form of Transportation.

machines are in regular use, but the "jitney" became a public institution there months ago, and the possibilities are better understood because of the longer experience. In a number of the cities of the Pacific Coast where the "jitney" cars have been used for considerable periods some attempt has been made to organize and systematize the services, with seemingly satisfactory results.

The American people are committed to rapid transit. They have been educated to the saving of time in travel, and the fact that a machine that has small passenger capacity and needs to make but a few stops can make faster trips over a given route than the average trolley car, which

serve stated routes. Expansion or extension are subjects that demand careful consideration, but the trackless transportation lines can make daily changes, or vary from routes ordinarily served, without expense or causing criticism, and can begin or discontinue operation at will, there being no especial value attached to any service other than that estimated by the "jitney" operator or owner.

From the viewpoint of meeting public convenience, of serving a comparative few, the "jitney" is superior to the public service corporation which must make substantial investment before service can be begun, which must be assured of reasonable patronage that will justify

obtaining franchise, building tracks and erecting poles and wires, purchasing cars, and at least increasing its operating organization before it can



A Maxwell Car Used for "Jitney" Service in Providence, R. I.

meet the demands of the public.

The average citizen must travel a definite mileage daily, and any additional transportation is incidental. With the majority there is necessity and then convenience to be considered. Obviously the former is exacting and the latter is optional. The trolley lines have been developed first with a view of meeting the necessities of the public and so far conveniencing it as conditions justify. Because the "jitney" car can be driven anywhere and at any time it can be made a convenience, even if it lacks the permanency and regularity of the trolley service. In other words, the "jitney" can better accommodate the people individually.

In Rhode Island the number of pleasure cars in use for passenger service is far greater than those who first engaged in it believed was probable, and there are those who assume that the migration of the thousands of people from the cities to the summer colonies along the shores of Narragansett Bay, and the opening of the numerous summer attractions, will impel many others to engage in the business.

The "jitney" service in Rhode Island cities and towns has affected the business of the Rhode Island Company materially. This is a result experienced in practically every community where

the "jitney" has been introduced. Estimates of the gross receipts of the drivers operating have been made with the assumption that the aggregate is a direct loss of revenue by the trolley company. While undoubtedly a good share of the "jitney" earnings are drawn from the street railroads, a considerable proportion is received from an element that bestows its patronage because of the novelty of the service, which could not justly be included in the normal receipts. Failure to understand that the figures estimated as loss are probably considerably in excess of the actual decrease of the average daily receipts of the street railroads, and that the estimated aggregate revenue of the drivers is more than might be realized in continuous operation, has created erroneous opinions as to the inroads of the "jitneys" into the corporations, and ignorance of actual operating costs, and supposition that large profits are made by "jitney" owners, has impelled the extremely large number to engage in the service, temporarily at least.

Decrease of Trolley Company's Receipts.

Statements have been made that the Rhode Island Company's receipts have been decreased \$100,000 or more a month, and that this will mean a loss of at least \$1,000,000 in receipts during the present year. These, however, have not been authorized by the company, and though the officials of the company intimate that the company has exclusive franchise, that it is an established institution and a public necessity, that it



An Every-Minute Scene: Letting the Trolleys Pass and Waiting for the "Jitney."

is a very large taxpayer, that it pays in addition state and municipal franchise taxes, that its property investment ought to be protected, the com-

pany has not undertaken to press its claims for protection. There are, of course, Rhode Island stock and bond holders whose property rights ought to be considered.

Legislation Already Pending.

Bills are pending in the General Assembly which comprehend the issuance of licenses for "jitney" cars, require them to travel defined routes with option of leaving them for short distances to convenience passengers, require bonds that will be used to indemnify claimants for damages who successfully prosecute their claims, prohibit the carrying of passengers who cannot be given seats, declare the "jitney" cars common carriers and place them under the jurisdiction of the Public Utilities Commission, and give the towns and cities authority to enact ordinances to regulate the use of the machines in the high-



One Can Observe That the Public Will Wait as Trolley Cars Pass, Evidently Preferring to Ride in "Jitney" Buses.

ways. Numerous amendments have been suggested for these bills, which are now before the legislative committee, and naturally during the pendency of the bills the cities and towns will not be inclined to enact ordinances. This means that until the bills have been enacted into law conditions cannot be materially changed. In addition to this, the influence of the railroads will undoubtedly be exerted to protect themselves so far as this is practical.

Operators Form Associations.

The owners and drivers of the "jitney" cars have meantime been very active. With the advice of a representative of an association that is said to have strength on the Pacific Coast and in the West, the Rhode Island Jitney 'Bus Association and the Blackstone Valley Jitney 'Bus Association have been formed, which have made overtures for affiliation with local labor bodies.

and the associations have undertaken to promote the interests of the members by agreements with reference to routes, schedules of operation, terminals, etc., and are seeking to establish mutual insurance. The memberships have increased so rapidly that the bodies have not as yet been successful in reducing the service to anything like system, but the members are not unwilling to accept public opinion as a guide, and have sought to stimulate the sentiment of the people by voluntary contributions of service for charitable purposes.

What has happened in Rhode Island, so far as developing the "jitney" service is concerned, has been real progress. The men who own and operate the machines have realized the possibilities and have not sacrificed their own prospects by disregard of public demands and requirements. The favor of the people has impelled the organization of at least two companies which purpose to inaugurate service that will be systematized and will have equipment better adapted to the requirements of transportation of the public than the light cars that are used by the majority of the owners. The promoters of these companies believe that with regular schedules and definite routes they will be well patronized, and the intention is to develop service in sections that have thus far been without the facilities the

people desire. Whether or not the patronage will justify the large investments that must be made can only be determined by experience.

No Definite Operating Cost Figures.

No really definite facts as to what can be earned by a "jitney" car operator are known so far as Rhode Island is concerned. There are drivers who have been well patronized since their cars have been in service, and who have aggregate receipts largely in excess of the expenses they have been required to meet, but the periods of use have been so limited and the conditions so variable that no logical conclusions can be drawn as to what the average net returns will be.

The very large majority of the drivers use light cars, these ranging from the new machine to that which has practically reached the end of its usefulness, and while the carrying capacity of these are limited, if seats are the basis of esti-

mate, they have been found decidedly more economical than cars that have accommodations for more passengers, but cost more to operate. The light car will carry four passengers and a driver, as against six passengers and the driver of the large machines. But the operating cost of the latter will probably be double that of the former.

Passengers Ignore Inconveniences.

Passengers are now carried standing, on running boards, and sitting in each others' laps,—inconveniences which they would not endure for a moment with any other class of conveyance, and many of the machines are at times greatly overloaded. But in the opinion of the people "everything goes" in a "jitney." The weather has been remarkable for the season of the year, there being but little rain and no really cold temperatures, two conditions which have been extremely favorable to the operators and the people alike, for there have been no storms such as might be expected in March, and which might have discouraged riding in open vehicles protected only by tops.

The conditions elsewhere in the country with reference to "jitney" service have hardly paralleled those in Rhode Island in any respect, and the people have not as a rule taken as kindly to them. Neither has there been the realization by the drivers and operators that the continuance of the patronage they desire depends largely upon the manner in which they conduct the service. Wherever operated, the "jitney" cars have demonstrated the possibilities of fast, light units that can be driven anywhere and at any time, as compared with trolley railroads operated on time schedules, so far as the convenience of the public is concerned. But to what extent the public will support such service is quite another proposition, and experience with "jitney" cars in any section of the country has not proven the service as a whole to be profitable.

One of the undertakings of the "jitney" owners' associations in Rhode Island has been to so apportion the routes on which machines are operated that the competition between the members will not be destructive, and the privilege obtained by priority of service will not be made unprofitable by the operations of others engaging in it later on. The public patronizing the "jit-

ney" cars has not appeared to demand any quality of vehicle in which to travel, for any machine bearing a sign, no matter what its condition mechanically, so long as it can be operated, has been accepted as satisfactory. Undoubtedly there has been little disposition to criticize a vehicle in which one can ride for the same price as in a street car.

The one weakness of the "jitney" service, so far as it being a permanent institution is concerned, is the fact that those engaging in it are not obligated, through investment or otherwise, to continue, and no assurance exists that what is available today can be relied upon for any considerable period. The public has seemingly given this aspect, which is undeniably very important, no consideration whatever, while it is stimulating "jitney" competition with trolley companies. No one who has given the subject



"Jitneys" Waiting at the End of the Route for Additional Fares.

even casual thought will deny that the "jitney" service has come to stay, but there is equally good reason to believe that the individual competing with the public service corporation is hardly practical from a business point of view. In other words, the "jitney" service can be made permanent, provided that it can be made profitable to those operating it.

The fifth annual grand ball of the Massachusetts Automobile Operators' Association, held recently in Horticultural hall, Boston, Mass., was stated to be the greatest success in the organization's history. Governor Walsh, Mayor Curley of Boston, Mayor Good of Cambridge, Ex-Governor Guild and other notables were the guests of honor. There were over 3000 present and the hall was decorated for the occasion. The organization, numbering now about 1100 members, is one of the strongest of its kind in the country.

LINK NEW YORK AND WASHINGTON.

A perfect road between New York City and Washington, D. C., is now available to the motorist. The completion of the short stretch of road between Principio Furnace and North East, Md., makes it possible, for the first time, for motorists to travel between the two cities over a nearly perfect roadway. This part of the route would have been completed last year but for a relocation which was not contemplated when the contract was first let. Another relocation was made near Kingsville, which materially improves this route by the elimination of two hills.

Transcontinentalists who plan to use a southern route one way will find that a great deal of work has been done during 1914 and much better conditions prevail than is generally supposed. The Washington-Richmond-Atlanta route is completed except for two miles of road between Pohick and Lawton and about eight miles in Prince William county. While no state, county or federal funds are available to complete this road, the automobile clubs of Virginia are raising money by private subscriptions and the road will be in good condition before summer. The United States office of public roads has undertaken the maintenance of this highway and has appointed three of its engineers to advise as to the best means for keeping it in good condition.

Until such time as the two links in Virginia are completed, motorists will probably use the Shenandoah valley. The Valley pike between Winchester and Staunton has been much improved during 1914 and is now in better condition than ever before. Connecting with this pike the stone road through Berryville, Halltown and Hagerstown is in splendid shape, and there is hardly a foot of the road from Baltimore via Frederick, Hagerstown, Berryville to Staunton in poor condition.

West of the Mississippi, much money has already been spent to make a southern route practicable. The State of Arkansas has let contracts for 10 miles of road to connect with the bridge just north of Memphis, and 11 miles to connect with the ferry from Trotter's Landing to Helena. This is particularly pleasing, as that part of the Southern National highway has always been in very bad condition. New Mexico highway officials are co-operating with the road associations and have constructed a good highway between Las Cruces and Deming. This considerably shortens the route to Phoenix, Ariz., and eliminates the poor stretch into El Paso.

GOOD ROADS IN THE SOUTH.

At the present time the South is enthusiastic over the various plans that have been brought to the front within the past few weeks calling for better roads. It is apparent that the South does not intend to be overlooked in the distribution of interstate road travel. The southern governors and legislatures are taking active steps towards bringing forth tangible results in the very near future.

The general assembly of North Carolina has just adopted resolutions of greeting to Virginia, Tennessee, Arkansas, Texas, New Mexico, Arizona and California, requesting that their governors and legislatures, the entire South and the federal government, co-operate to secure the completion of unfinished links in the Southern National highway. It is pointed out that the North has two open lines, while the South has none. The response was instant and enthusiastic, proving that it is still a "Solid South" in the best sense.

In transmitting the resolutions to Virginia, Governor Craig sent a personal representative, Dr. S. M. Johnson, one of the leading spirits of the Southern highway, to Governor Stuart with a message which closed as follows: "The vision of this great highway has grown ever more distinct, until it seems to me the loftiest in conception and the most beneficent in promise that has ever appealed to the high patriotism of our people. It links the North and South, the East and the West, the old and the new, in a bond of living unity, interest, hope and endeavor, too strong for either strife or war to ever break".

Governor Stuart stressed the movement by a message to the Virginia legislature in which he said: "The Southern National highway appeals irresistibly to the patriotic impulse. It links together Richmond and Washington, the South and the North from coast to coast. With conditions favoring outdoor life at a time when many in the North seek relief from cold, this highway promises much for that national unity which is born of personal touch and closer acquaintance formed in travel. When we consider these things, we conclude that President Wilson must have had in mind the great through routes of auto travel when he stated, at the American road congress at Atlantic City, that his enthusiasm for good roads was mainly because they promoted the wider acquaintance which breaks down sectionalism, and enables people to think, feel and act together in all that pertains to the national life.

TOURING THROUGH COLORADO.

*By A. W. Henderson.

THE European war has focussed attention more strongly than ever before upon the idea embodied in the phrase—"See America First." Thousands who have been in the habit of spending their vacations, winter or summer, abroad, are scanning the map of the United States with renewed interest and are discovering that natural attractions, scenic wonders and good roads which they had hardly thought in existence are to be found without the necessity of making an ocean voyage and within easy accessibility.

With the great impetus which the automobile has within recent years given to touring, and with the rapid development of better roads, the motorist has become an important personage whose favor communities in all parts of the land are seeking. This is particularly true of those sections in the scenic Rocky mountains, where old roads are being improved or rebuilt and new scenic highways are being developed with astonishing rapidity.

The Pikes Peak region, formerly content with the general title, "America's Scenic Playground", takes cognizance of the importance of the motor travel in its new slogan, "The Motorist's Mecca". The motorist planning a vacation or contemplating a cross country trip wants to know what the various points have to offer that is worth his while and will repay him in pleasure, in health and in new and different sights. An eastern authority on motor touring visited Colorado two years ago and made a trip of a thousand miles through its mountains. When he returned home, he wrote:

"Colorado has within her borders more mountain scenery than all Europe can boast of. Today it is possible for a tourist to spend three weeks in the heart of the Rockies, to travel during that period 1500 miles and to get more vistas of mountain scenery and fathomless canons than he could obtain in a similar period in the Alpine sections of Europe. The American tourist today does not know his own country; he does not know the mystic beauties it affords in its far-away fields of western grandeur. The roads are there; the scenery is there; the hotels, to an extent, are there; the signboards are more prolific

than in New England.

"The owner-motorist who is accustomed to driving his own car over the varied roads of the country will not have any difficulty on a two weeks' mountain trip. At times he will skirt apparently bottomless canons, but there is no immediate danger. At other times he will be far above the timber line; but the roadway is as safe as through the fields of the East. If he has his



Motoring in Garden of the Gods, Near Colorado Springs.

car in rational condition, it will not be necessary to have to be towed in a single instance. Each day's journey will bring fresh and thrilling vistas.

"No other state has so much to offer the tourist in variety of scenery as has Colorado. To those who have never seen the Rockies it is impossible to picture, even with the best photographs, the mountain landscape with its tremendous heights and depths. There is something so big about

*Secretary Pikes Peak Ocean to Ocean Highway Association, Colorado Springs, Col.



In Ute Pass, Col., on the Pikes Peak Ocean-to-Ocean Highway.

these snow-capped mountains of enormous heights that no one with red blood in his veins can see them and not feel the uplifting, inspiring influence.

"Too much cannot be said about the road conditions in Colorado as compared with other sections open to motor travel. Although not boulevards, the number of miles affected by wet weather is remarkably small. Furthermore, the rainfall in Colorado is almost a minimum, particularly during the touring months. Every one of our party, on completing the trip, unequivocally stated that he would rather make the trip from either Denver, Colorado Springs or Pueblo to Grand Junction than to travel over almost any other equal distance in the United States."

This writer made his trip in October, 1912. Since that time Colorado has revised its highway laws, creating a state highway commission—the

personnel of which has been remarkably high, and the efficiency of which is attested in a notable improvement of the main highways of the state. Nearly \$3,000,000 has since that time been spent on state highways, and at the election in November last the people by a tremendous majority voted a half-mill levy for road purposes, which will be expended under the jurisdiction of the state highway commission in co-operation with counties throughout the state. This will give a permanent fund of about \$600,000 a year to supplement the county levies. Colorado has mapped out a comprehensive system of highways covering all the state, and local and state officials are working together in harmony to make in reality a net work of roads, scientifically correct from the engineering and road point of view, that will open to the world scenic wonders it never even dreamed America possessed.

Colorado is doing this for the benefit of the rest of the United States. It is true that its people expect to secure returns from their investment—but the roads that are being built are, in a great many instances, not those needed for local travel, but those which connect together links in great transcontinental or great north and south highways and which open to the tourist the wonderfully scenic mountain sections.

In 1915, unless all signs fail, there will be an unusual travel east and west—by railroad and by auto. Four or five years ago it was considered quite a feat to have made a transcontinental tour by motor, and the tale of the returning traveller was listened to with about the same degree of wonder and admiration which would be given a Peary or a Stanley. Today, transcontinental touring is becoming so common that the banner



On the Pikes Peak Ocean-to-Ocean Highway, Near Colorado Springs, with Pike's Peak in the Background.

"New York to San Francisco" excites little more than passing comment as the tourist passes from town to town along his way; and he himself—unless he is more than ordinarily unfortunate in his experiences with the weather man—has little to tell of hardship when he has completed the journey from one coast to the other.

There are today many distinct transcontinental routes—each with its advantages, and each with its loyal advocates who are doing all they can not merely to sing the praises of the road, but to see that actual development work is done where it is needed and to bring the road to the greatest possible stage of development.

Colorado is easy of access to the transcontinental motorist. The Santa Fe trail, a part of the National Old Trails road, runs through the southern part of the state, with splendid connections to the famous mountain sections, which are easily reached by good roads from Pueblo, Colorado Springs, Trinidad and Canon City. The national Lincoln Highway Association has felt the attractions of Colorado so essential to a transcontinental tour that it has made the one deviation from its main road, where it establishes an official branch from Julesburg to Denver and thence back to Cheyenne. At Denver the road connects with a number of highways through the mountains, to the Pikes Peak region and other scenic sections, while from Greeley and other points in northern Colorado it joins those highways leading to Estes park and other wonder places.

The central route, however, and the one which cuts directly through the heart of Colorado's scenery is the Pikes Peak Ocean to Ocean



Another Scene on the Triangular Road, Which Entirely Encircles Pikes Peak, and Traverses Ute Pass.

highway. This is perhaps the newest, and yet the most vigorous, of the transcontinental routes. It has today a definite, active organization from Terre Haute, Ind., through to Salt Lake City, Utah, with splendid, recognized connections both at these eastern and western terminal points. At Terre Haute it joins with the National Old Trails road, which continues eastward through Indianapolis. Columbus, Wheeling, Cumberland, Md., to the National Capital, Washington.

There is also a connection at Springfield, Ill., with the road which follows the southern shores of the Great Lakes, through Toledo and Cleveland, O., Erie, Penn., Buffalo and Rochester, N. Y., and thence to Albany and down the Hudson river to New York City.

From Terre Haute west, the road touches Spring-



On the Colorado Springs-Canon City State Highway, a Newly Constructed Road That Passes Scenes of Unusual Beauty.



Pikes Peak from the Colorado-to-the-Gulf Highway, Between Colorado Springs and Denver.

field, Ill., Hannible, Mo., Chillicothe, Mo., St. Joseph, Mo., Belleville, Kan., and Colby, Kan., where it connects with three roads through central Kansas, Burlington and Limon, Col., and on to Colorado Springs, Colorado City, Manitou, and the Pikes Peak region. Here it touches the mountains and cutting through the historic Ute pass, crosses the South park, to Buena Vista, thence to Leadville, the famous mining camp, and crosses the Continental Divide on an improved four per cent. grade. Think what it means to the transcontinental tourist to approach to and descend from the "Top of the World" on such a grade as this!—and as this article is being written the first of December that road, at an altitude of 10,400 feet, is in daily use. From the top of Tennessee pass, the journey continues with a spectacular, never to be forgotten ride down Homestake

gulch, up and over Battle mountain and into the peaceful valley of the Eagle river. Then through the wonderful canon of the Grand river, where there is being rebuilt by convict labor a 15-mile boulevard, and on into Glenwood Springs, gives a day's ride which is without an equal anywhere on the American continent. At Rifle the highway leaves the railroad and goes northward through the rich Meeker and Vernal section, traversing a splendid and interesting section of Colorado and Utah, with less than 30 miles desert, and following improved roads practically all the way to Provo and thence into Salt Lake City, the capital of the land of the Mormons.

At Salt Lake City there are several options for the westward journey—roads both to the north and south of the Great Salt lake; the National Lincoln Highway route to Reno and San Francisco, or the road by way of Tonopah either to San Francisco or Los Angeles. Here there are connections with roads that are being developed north through Ogden and Pocatello, to the Yellowstone National park, and south through a picturesque country to the northern rim of the Grand canon.

Other things being equal, the transcontinental motorist will select the road of greatest scenic interest. He is usually making the trip, not to see how fast he can travel, but to learn all he can of outdoor America. To demonstrate the absolute feasibility of the Pikes Peak Ocean to Ocean highway a reliability run was carried out most



On the Colorado Springs-Cripple Creek-Canon City Triangular Road, Which Connects These Three Cities.

successfully in August last under the joint auspices of the Colorado Springs chamber of commerce, the Salt Lake City Commercial Club and the Pikes Peak Ocean to Ocean Highway Association. Tourists from New Jersey, New York, Michigan, Oklahoma, Missouri, Kansas, Colorado and Utah participated. Some returned by other routes from Salt Lake City eastward, and the opinion of impartial observers was that the Pikes Peak Ocean to Ocean highway is in as good, if not better, condition than any other route from the eastern side of the Rocky mountains to Salt Lake City; that its scenery is beyond the power of description; and that the people are so thoroughly interested all along the way that a permanent highway, good accommodations and courteous treatment are assured the motorist.

Look at the map and it will show you that the Pikes Peak Ocean to Ocean highway crosses the central part of the United States in a line as straight as the contour of the country will permit; that it traverses a section rich in natural resources, of diversified commercial, agricultural and mining interests; a territory rich in historic associations and a mountainous section that is unrivalled in all the world for its magnificence and grandeur.

NEW HAMPSHIRE ORGANIZATION.

The first step toward the organization of a state automobile dealers' and accessory dealers' association was taken the other evening at Manchester, N. H. As a result of the meeting a temporary organization was perfected, and committees were appointed and arranged for future gatherings. W. R. Bliss of the Goodyear Tire and Rubber Company, and George P. Brophy, president of the Massachusetts Automobile Dealers and Accessory Dealers were the principal speakers.

WINTON REPAIRS CONTEST.

The Winton Motor Car Company, Cleveland, O., has announced its eighth annual Winton "Six" repairs expense contest, in which \$3,500 will be distributed among the 25 chauffeurs making the best upkeep records between May 1 and Oct. 30. Unlike in the previous seven contests, in which the company has paid to 82 winning chauffeurs a total of \$21,500, this contest will have a maximum mileage of 12,500 miles. Any contestant who has driven that number of miles

before Oct. 30 will not be required to continue, it being ruled that no record beyond that mileage will be considered. First prize will be \$500; second, \$400; third, \$300; fourth, \$200. Sixteen prizes of \$100 each, and five district prizes of \$100 each, will be awarded. The latter are provided for the best remaining record in each of five sections after the first 20 prizes have been awarded. In addition, the best record for the "new size" Winton "Six" will win for its owner a new car in even exchange for his old one.

MOTOR PARTS' SERVICE.

A service that appeals to tourists in New England is given by the Motor Parts Company, which is the distributor of all Bosch and Kemco products. Zenith carburetors and special Zenith Ford Attachments, and Leak-Proof Piston rings in the six states included in this section. It is represented in these states by 25 well established firms which handle its Bosch magnetos, Ford attachments, Bosch-Rushmore starting and lighting systems, Rushmore lamps, cables, spare parts, plugs, and Bosch starting and lighting systems; its Kemco fan type generators, two-unit starting and lighting systems, and the two-unit Ford starting and lighting systems. These concerns may be conveniently reached by motorists in need of service, being located at Boston, Lynn, Newburyport, Gloucester, Springfield, Worcester, Fall River and New Bedford, all in Massachusetts; Providence and Newport, in Rhode Island; New Haven, Waterbury and Hartford, Connecticut; St. Albans and Manchester, Vermont; Concord, Nashua, and Portsmouth, New Hampshire; Portland, Augusta, Auburn, Ellsworth, Sanford and Dover, Maine.

FREE COURSE IN AUTO ENGINEERING.

The construction and maintenance of automobiles and the theory of motor engineering are being taught free of charge in the Central Continuation School, Milwaukee, Wis., as a part of the city's system of free public education. The first course, which is intended largely for owners, is in charge of Herbert L. Connell, an automobile engineer of prominence and a graduate of the University of Michigan. The engineering course, which is designed for those who intend to earn a livelihood in the automobile industry, is conducted by R. A. Davis, who had charge of a university extension course in automobiles in Iowa.

CAR ACCESSORIES AND EQUIPMENT.

NEW APCO TIRE HOLDER.

Designed to Carry Shoes on the Running Board Where They Are Protected From Heat and Mud.



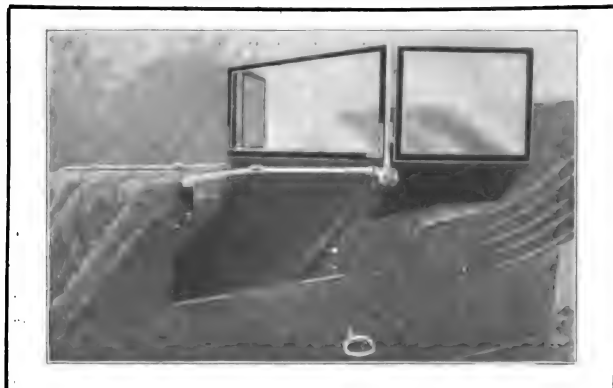
Apco Side Tire Holders.

and compact. No straps are necessary. The holders were designed to accurately fit the Ford size of tires. They retail for \$2 the set.

AUSTER TONNEAU SHIELD.

The Fryer-Auster Company, Providence, R. I., Is Marketing an Ideal Summer and Winter Touring Equipment.

A shield that positively protects the tonneau seats from all wind, dust and back draught, is the original and patented English tonneau shield, protected by U. S. patent, that is marketed by the Fryer-Auster Company, Providence, R. I. As is shown in the accompanying illustration, the shield is adjustable and can be extended from the back of the front seat so as to thoroughly pro-

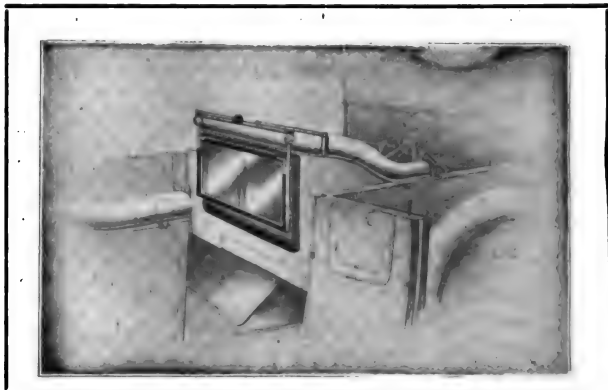


Shield Extended to Protect Rear Seats.

tect the occupants of the tonneau without obstructing their sight. When desired, the shield can be folded flat against the back of the front seat where it is safe from breakage.

It will make any touring car as comfortable and

nearly as warm and weather-proof as a machine with an enclosed body. It is a practical, ornamental attachment, finely made and of the best material, and is thoroughly guaranteed as to workmanship and finish and to give protection to passengers in the back seats.



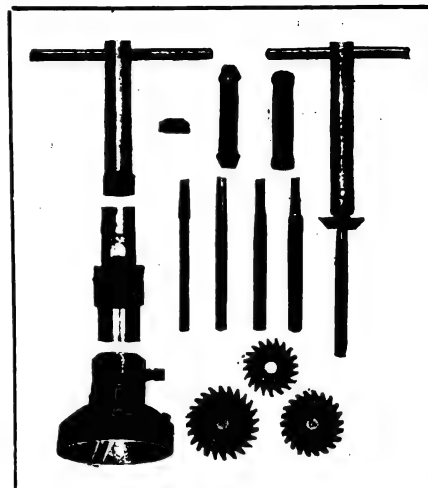
Shield Folded Up—When Not Wanted.

It is said that more than 50,000 Auster shields are in use in Europe on all makes and models of cars. It is easily and quickly attached and can be used on any pleasure car. Further particulars can be obtained from the Fryer-Auster Company, 11 Pine street, Providence, R. I.

FOSNACHT VALVE RESEATER BOOKLET.

H. G. Paro Will Send a Copy Gratis to Any Person Requesting This Interesting Little Book.

H. G. Paro, Suite 718-719 Michigan Boulevard Building, 30 North Michigan avenue, Chicago, Ill., has published an extremely interesting and instructive booklet on the Fosnacht Valve Reseater. This little publication, 3¼ by 6¼ inches, printed in two colors, is entitled "Bigger Profits for Every Garage Man." The book is illustrated to show the Fosnacht valve reseater in every practical use. Statement is made that with this tool the mechanic or repairman can cut a valve true with a minimum loss of material, thus prolonging the life of the valve; that by its use, three-quarters of the time usually required to reseat valves is saved; that it saves time when reboring cylinders and replacing rings, and that it occupies but small space when carried in the car for use by hand. The Fosnacht reseater is fully guaranteed for one year as to workmanship and material, and any part that is defective will be replaced by the company free of charge. Copies of this booklet will be sent free upon request.



Fosnacht Valve Reseater.

CAR ACCESSORIES AND EQUIPMENT.

THE LIBERTY BELL COMPANY.

Manufacturers of Novel Electric Signal Have Exclusive Territory for Worth-While Dealers.

The Liberty Bell Company, the Arcade, Cleveland, O., manufacturer of the novel electric signal known as the Liberty Bell, is making a very liberal proposition to



The Liberty Bell, a New Automatic Signal.

dealers who wish to handle an accessory in much demand. One type of this bell not only serves as a signal, but is also a warning lamp. Mounted on the top of the bell and fully protected, is a lamp with a ruby lense, which is flashed when the bell is sounded, as may be noted by the accompanying illustration. The sound of the bell is melodious and penetrating, and appeals to all motorists who desire a high-grade, efficient signal, pleasing to the ear as well as the eye. The company points out that the dealer who wishes to handle this line does not have to make a large investment, as a half or quarter dozen will demonstrate its quality and the existing demand for this novel and interesting accessory. A letter or post card to the company will bring complete details to the inquirer.

MALCO ELECTRIC TAIL LAMP.

Equipment That Will Not Jar out or Smoke, and Consumes Less Than a Half Ampere Per Hour Current.

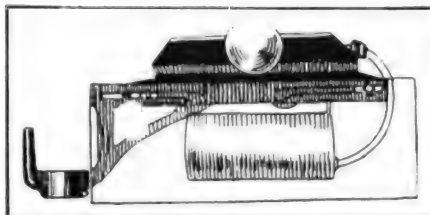
The Malton Specialty Company, Boston, Mass., is selling the Malco electric tail lamp, which is lighted for 45 hours with one ordinary dry battery, and 95 hours by two batteries. It is exceedingly well made, finished in ebony with nickel trimmings, and sells for \$3.50 for either the one battery or two battery equipment. It will fit any number plate holder without alteration, illuminates the numbers and shows the end numbers clear and bright, and can be installed in less than 10 minutes.

The Malco electric tail light was designed primarily for Ford cars, but its neat appearance makes it suitable for any high-priced car; it will fit any machine. The Edison socket and switch are made in unit and set in one end of a hood reflector which is elongated sufficiently to spread the light over the entire number plate. The interior of the reflector is silver plated, and the base of the reflector lamp is fitted with an intensifying glass which excludes dust, mounted on the hood, while the two battery outfit has a 2½-inch signal, etc. The battery case, as is shown in the accompanying drawing, is located behind the number plate and attached to

the wooden sill of the car body by two screws, the light and reflector being slipped in between the two bolts which hold the number plate.

This device is recommended to the car owner because of its efficiency, its neat appearance, and its comparatively low cost. The manufacturer points out that

the investment of \$3.50, the price of either equipment, will save the car owner a possible fine of \$10. Its action is positive and it eliminates the smoke, dirt and trouble of gas and oil lamps. Further particulars can be obtained by addressing the Malton Specialty Company, 755 Boylston street, Boston, Mass., and mentioning The Automobile Journal when writing.



Malco Electric Tail Lamp.

ELECTRIC STARTER FOR FORD CARS.

Puritan Machine Company, Detroit, Mich., Can Make Immediate Delivery of 400 Complete Systems.

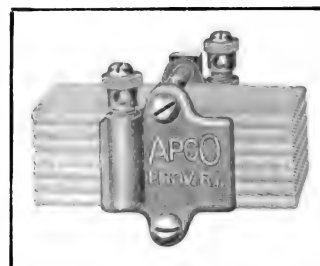
The Puritan Machine Company, 41 10th street, Detroit, Mich., has purchased the assets of the Detroit Electrical Appliance Company, maker of Deaco electric lighting and starting systems. This purchase includes the stock and repair parts of the Deaco Company, from which the Puritan Machine Company can make immediate delivery of 400 complete systems. These are offered for \$55 each, f. o. b., Detroit. These starters are adaptable to the Ford or other make cars, and are being sold by the Puritan Company for less than cost.

This is but one of the many "specials" offered by the Puritan Company, and in its stock of 1,300,000 different parts and accessories for motor cars and trucks, the purchaser can find many worth while bargains.

SPRING LEAF LUBRICATOR.

Auto Parts Company, Providence, R. I., Announce a Very Useful Ford Specialty.

One of the latest specialties produced by the Auto Parts Company, Providence, R. I., is a spring leaf lubricator for Ford cars. This lubricator consists of a pair of plates having an oil reservoir and felt inserts. These inserts rest against the side of the springs and feed the oil between the leaves by capillary action. They keep the frictional surfaces constantly lubricated and improve the riding qualities of the car. These lubricators are sold four to a set for \$2, and can be attached by the owner in a few minutes. This is one of the four new products the Auto Parts Company announced recently, the two others being described in this issue, and the fourth, a front axle brace, was explained in detail in the March 10 issue of The Automobile Journal. The Apco front axle brace, which consists of two ingenious clamps and a steel rod, like all other Apco specialties, is of extreme simple but effective design, and can be attached in a very few minutes by the novice as well as the experienced motorist.



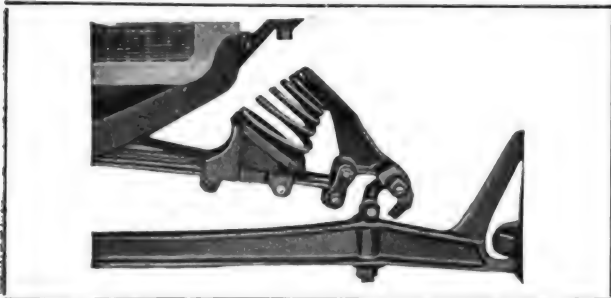
Apco Spring Leaf Lubricator.

CAR ACCESSORIES AND EQUIPMENT.

HASSLER SHOCK ABSORBER.

Indianapolis Concern Has Efficient Equipment for Ford Cars That Is Greatly in Demand by the Trade.

Robert H. Hassler, Inc., West 10th and Canal streets, Indianapolis, Ind., is selling a set of four Hassler shock absorbers to Ford owners at a retail price of \$20. This



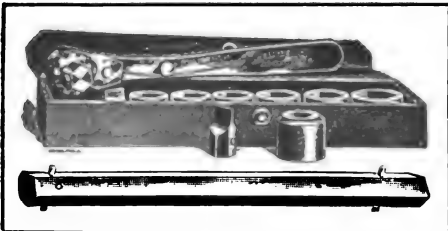
The Hassler Ford Shock Absorber.

equipment as may be seen from the accompanying illustration, is a new type absorber, with which the company maintains tossing and rebound are entirely eliminated. These absorbers make for easy steering and safe driving, and will not strike the lamp brackets or body. The company is selling the Hassler device by comparing its qualities with similar equipment, and the guarantee is broad in every respect. By inquiry made to the manufacturer at the above address the dealer or jobber will receive detailed information of the absorber installation requirements, etc., together with prices and discounts.

LANE UNIQUE RATCHET WRENCH.

A Special Tool for Close and Difficult Work from Which the Dealer Should Realize Large Profits.

Will B. Lane, 180 North Dearborn street, Chicago, Ill., is manufacturer of the Unique ratchet wrench, a special tool that should be in large demand, and ought to be a source of lucrative profit for progressive dealers. The Lane Unique wrench is designed for use in close and difficult work and for service where the space is limited. One desirable quality is that it can be used to turn nuts very close to a wall. The tool is complete in every detail, including sockets that will not break or split, extension bar, etc. It is sold with a strong guarantee. It will be specially useful for repairmen or garagemen, as with it much work can be done that is frequently performed with a cold chisel, a method that is necessarily destructive.



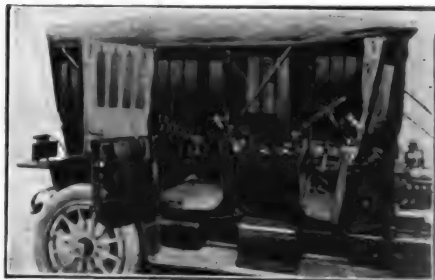
The Lane Unique Ratchet Wrench.

An inquiry to the above address will bring the dealer or jobber full details of the construction and uses to be made of the tool, trade discounts and other information that will be of interest to interested parties.

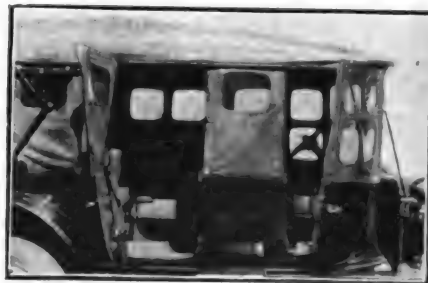
BLACKMORE CURTAIN OPENERS.

Dayton Top Improvement Company Equips Its Latest Design Automobile Curtains with This Device.

The automobile curtains made by the Dayton Top Improvement Company, Dayton, O., are equipped with the Blackmore curtain opener, which the company maintains will afford the greatest convenience for car users. With this opener the motorist can open the door instantly and close it tight without buttons. A bracket supports the curtain at the door edge and swings open the door section of the curtain, or tightly closes it. This eliminates the use of curtain buttons. The company states that this improvement has been used, because of the many unusual qualities at an increase in cost, on the 1915 models of Packard, White, Cadillac, Chalmers and Hupmobile cars. The curtains are being tried by other manufacturers, and the manufacturer expects that a large number of concerns will add them to their equipment. The Blackmore curtain openers are especially desirable for winter use, although their convenience is equally satisfying whenever curtains are needed. The equipment practically incorporates the curtains with the doors, so that both are opened and closed together, and the passenger can as conveniently enter or leave the car as he would a limousine. Motor car manufacturers using these find that the curtains have increased the utility and comfort of open cars during the winter months, for instant ingress or egress to a car without the necessity of removing the curtains from fasteners, is a quality that is highly approved by ladies.



Dayton Curtains with Doors Open.

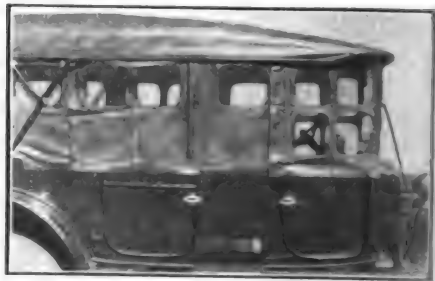


Dayton Curtains Used on Packard.

turer expects that a large number of concerns will add them to their equipment. The Blackmore curtain openers

are especially desirable for winter use, although their convenience is equally satisfying whenever curtains are needed. The equipment practically incorporates the curtains with the doors, so that both are opened and closed together, and the passenger can as conveniently enter or leave the car as he would a limousine. Motor car manufacturers using these find that the curtains have increased the utility and comfort of open cars during the winter months, for instant ingress or egress to a car without the necessity of removing the curtains from fasteners, is a quality that is highly approved by ladies.

These retail at \$1.50 a door curtain and liberal discounts are made to dealers or top makers. Any accessory dealer or garageman interested in this line should communicate with the company and mention The Automobile Journal. Full information as to discounts, selling plans, etc., will be supplied.



Car Completely Enclosed with Dayton Curtains.

CAR ACCESSORIES AND EQUIPMENT.

LUCAS AUTO HEEL REST.

J. L. Lucas & Son Make an Ingenious Specialty That Adds Much to Motoring Comfort.

J. L. Lucas & Son, 40 Fox street, Bridgeport, Conn., manufacture the Auto heel rest, a specialty that is selling rapidly and is a very profitable equipment for live dealers and agents. The Auto heel rest is designed for use on all cars, and it serves equally well when operating either the brake or clutch pedals or the foot accelerator. It raises the foot to a comfortable right height and easy position, and relieves any strain at the ankle. The Lucas Auto heel rest is made of polished aluminum, and in four sizes, $\frac{1}{4}$ -inch, one-inch, $1\frac{1}{2}$ and two inches. As may be seen from the accompanying illustration this is a simple and ornamental accessory, and can be quickly and easily attached. A postal or letter to the above address will bring to the inquirer full details of prices, trade discounts, etc., and descriptive literature.



The Auto Heel Rest.

MARTELL ALIGNING REAMER.

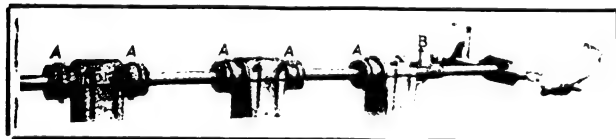
Harding Manufacturing Company Is Producing a Thoroughly Practical Tool for Repairmen.

The Harding Manufacturing Company, South Main street, Mansfield, Mass., is making the Martell aligning reamer, a tool with which a shop can successfully compete with any facilities of large factories. Any tool obtaining more accurate results than possible with manual methods, and which economizes in time, is a profitable investment for the repairman and the service station. This applies particularly to the motor bearings. Many large factories have abandoned hand scraping crank bearings because of inaccurate results and the time consumed.

With the Martell aligning reamer the work can be done quickly and accurately, and alignment insured. One of the several advantages of the Martell aligning reamer is that it can be used on any motor. It not only produces perfect surfaces in exact alignment with each other, but makes possible the correct meshing of gears. It is equally adaptable to connecting rod and other bearings.

The supporting bushings, shown in an accompanying illustration of the Martell reamer in service, are provided with a very fine thread on the tapered portions, and screw firmly into the ends of the bearings to be reamed. They are provided with means of adjustment in any direction, the range being about .095-inch. They also have a micrometer reading, showing the amount of "set."

The reamer consists of two heads, each carrying six



Martell Aligning Reamer Fitted to a Three-Bearing Crankshaft.

adjustable blades, the range of adjustment being about .08 inch. The small head takes all sizes from $1\frac{1}{2}$ to 1 inches, and the large from two to $2\frac{1}{4}$ inches. This

range is obtained by the use of six blades, which can be quickly changed.

The maker states that the operation of the tool does not require an expert; a workman more or less familiar with bearings and the use of a micrometer can operate it. The Martell tool eliminates uncertainty in estimating jobs for repair work. It is as easy to ream .02 as .002-inch.

Mr. Martell, the inventor of the reamer, is a well known mechanical engineer. For several years he was the head of the experimental and testing department of the Packard Motor Car Company. He is now with the Harding Manufacturing Company as factory manager. The company issues a booklet upon bearings, which will be mailed upon request. The Harding Distributing Company, Boston, Mass., is the sole distributor.

PYRENE FIRE EXTINGUISHERS.

Exceptional Opportunities Are Offered to Agents for This Fast Selling Safety Equipment.

The Pyrene Company of New England, 88 Broad street, Boston, Mass., is offering very attractive agency contracts to dealers in motor vehicle supplies and equipment. By using the Pyrene extinguishers the motorist can save 15 per cent. of automobile fire insurance. This fire extinguisher has been approved by the National Board of Fire Underwriters, and its efficiency has been demonstrated in hundreds of instances. In addition to protecting the automobile the extinguisher safeguards other property. Brass and nickel plated quart capacity extinguishers are standard equipment, are light in weight and occupy but little space in a car.

Pyrene extinguishers make an excellent display for dealers and garagemen, they sell rapidly and agents are sure of quick returns on capital. The company makes exceptional offers to dealers, and a letter to the Boston address will bring full information as to selling plans, price lists, discounts and all other data of interest. In these days of safety first crusades the dealer handling such a line as Pyrene realizes quick returns on his investment, and with the co-operation the company gives its dealers sales are guaranteed from the start.



THE DIXON DEALERS' BOOKLET.

Jersey City Manufacturer of Graphite Automobile Lubricant Has Published Valuable Literature.

In keeping with its policy of co-operating with its dealers to the fullest extent, the Joseph Dixon Crucible Company, Jersey City, N. J., has issued a 16-page booklet describing its graphite automobile lubricants. These are supplied to the Dixon dealer, and the name and address of the latter are printed on the three-color cover. This cover pictures the entrance to a garage or supply house and the name of the dealer can be printed, as if a sign, over the door. The first four pages are devoted to a pointed address to those interested in graphite lubrication, and following this are descriptions of the Dixon lubricants. A distinctive feature of these lubricants is the use of a series of well drawn pen and ink sketches that serve the triple purpose of showing the "which, where and how" of Dixon's graphite automobile lubricants. This booklet is an illustration of the Dixon co-operative thoroughness of the company's selling plan, and will be explained to interested dealers at request.



JORDAN WARNS FARMERS.

E. S. Jordan, sales manager of The Thomas B. Jeffery Company, Kenosha, Wis., has issued the following advice to American farmers: "Don't plant any more acres of wheat than you did last year!" Mr. Jordan is in close touch with the European situation through the several prominent officials representing the company in European capitals, where it is said more than \$3,000,000 worth of Jeffery motor trucks have been sold, and his advice is based upon their reports. It is said that Russia is making herculean efforts to move her immense supplies of wheat to the Black Sea ports, ready for immediate shipment when the Dardanelles and the Bosphorus are opened by the Allied fleets. India and South American wheat countries are said to have increased their wheat area this year, and will have a large surplus for export.

DINNER TO MARION MANAGER.

John Guy Monihan, vice president and general manager of the Marion Motor Car Company, Jackson, Mich., was given a farewell dinner at Indianapolis, Ind., March 18, on the eve of his departure for Jackson where he will reside. Frank Morrison of the Cole Motor Car Company, Henry Campbell of the Stutz Motor Car Company, George Dickson of the National Motor Vehicle Company, and W. S. Gilbreath of the Hoosier Motor Club, all of Indianapolis, spoke in glowing terms of Mr. Monihan, who is known nationally for his work for good roads and amateur touring.

Mr. Monihan was associated for many years in executive capacity with the Premier Motor Manufacturing Company, left that organization to become general sales manager of the Cole Motor company, and resigned from that position to assume the vice presidency and general management of the Marion Motor Company.

NEGLECT CAUSES IGNITION TROUBLE.

Ninety per cent. of battery and ignition trouble is due to neglect and carelessness on the part of the motorists, declares F. E. Watts, chief engineer of the Hupp Motor Car Company, Detroit, Mich., manufacturer of Hupmobile cars.

"The trouble is," said Mr. Watts, "that owners do not pay enough attention to care and operation of batteries. This is due to the fact that battery education has been sadly neglected by motorists. Most people look upon the stor-

age battery as a 'mystery box' and believe the less attention it is given the better. This is absolutely the wrong attitude. If there is one thing that requires a man's attention it is the storage battery. The battery is the very life of the car; it is the source from which the engine derives its existence. If the carburetor, as has been said so often, is the lungs of a motor, then the battery is the heart. Consequently it should be given constant care and attention. The Hupmobile Service Department has had special instructions printed for the care and maintenance of batteries. One caution that owners are given is to keep the battery fully charged. A second is against allowing the water in the cells to drop below a certain definite level."

BIG DEMAND FOR VICTOR GASKETS.

The Victor Manufacturing & Gasket Company, Chicago, Ill., has increased its capital stock from \$50,000 to \$100,000 to provide adequate manufacturing facilities made necessary by the big demand for its large variety of copper-brass asbestos cylinder head gaskets such as are largely used by manufacturers on detachable head motors. For the aid of owners, dealers and jobbers, the company has published a ready reference and list of Victor gaskets, illustrated, so that practically every size gasket on the market for repair purposes can be obtained at reasonable prices from the Victor company without first writing to the manufacturer for information. These lists can be secured by addressing the Victor Manufacturing & Gasket Company, Troy and 21st streets, Chicago, Ill., and by mentioning The Automobile Journal.

HUPMOBILE IN FRENCH BATTLELINE.

Emanuel Helen, celebrated French aviator and a member of the French military aviation corps, is using a Hupmobile model K at the front, according to a letter from J. L. Poole, European export manager of the Hupp Motor Car Company, Detroit, Mich. Helen recently fought and destroyed two German taube monoplanes in an aerial duel.

MOTOR TRUCK FOR MANSFIELD, O.

The city council of Mansfield, O., has adopted a resolution to purchase a motor truck for the water works department. It is expected that \$5,500 will be expended, the sum to be transferred from the fund of the department.

GENERAL NEWS OF THE INDUSTRY.

High Efficiency Methods in Scripps-Booth Factory—Greenleaf Company Merged with the Walter C. Lewis Company.

WITH the advent of the new Scripps-Booth car, manufactured by the Scripps-Booth Company, Detroit, Mich., a new personality has

been introduced into the automobile manufacturers' world—R. H. Spear, general manager of the company. Mr. Spear's long experience in factory organization is said to dominate the plant and to be responsible in a large measure for the financial as well as the mechanical development. Fifteen years ago Mr. Spear began as a stenographer in a probate court, became a chief accountant, and later general manager of the Hygeia ice plants. At that point in his career he became a system and organization expert, writing volumes that have become standard authorities upon factory costs and organization, etc., and investigated hundreds of factories throughout the country. He introduced high efficiency methods in the Scripps-Booth organization, and has, it is said, so organized that plant that it can turn out its car with a higher proportion of costly material in its make-up than is usual among the lower-priced makes. William B. Stout designed the Scripps-Booth car, which is now being delivered.



R. H. Spear, Scripps-Booth Manager.

shire street, Boston, and with this has been merged the Walter C. Lewis Company, for many years one of the best known agencies in New England. Mr. Lewis is a member of the Greenleaf Company, but he will devote more of his time to the Genesee Light and Power Company, of which he is president, and give the same personal attention as formerly to his advertising clients.

Mr. Greenleaf is a practical printer of wide experience. He entered the advertising field about 12 years ago, and for the past seven years was connected with Wood, Putnam & Wood, a widely known firm, and has handled many of the largest accounts of New England. He has been remarkably successful. Mr. Dunham has been identified with advertising agencies for 17 years, being first connected with the Pettengill Agency in the bookkeeping department, and for 10 years he was in charge of the accounting department of Wood, Putnam & Wood.

The Greenleaf Company has a very large clientele, including more than a score of the largest general advertisers in New England and among Mr. Greenleaf's personal clients are a number of the best known and most representative concerns in the motor vehicle industry, whose interests he has handled with decided success. The company's organization has been developed to afford an exceptional service.

GREENLEAF HEADS NEW CONCERN.

The Greenleaf Company, of which A. E. Greenleaf is president and G. R. Dunham treasurer, has been organized to conduct a general advertising agency, with offices at 185 Devon-



A. E. Greenleaf, President Greenleaf Company, Boston, Mass.

Digitized by Google

TIMKEN-DETROIT EXPANDS PLANT.

The plant, building and machinery of the Metal Products Company have been purchased by the Timken-Detroit Axle Company, Detroit, Mich., in order, it is stated, to meet the demands of increased business. Among the recent contracts made by the concern are those of the Saxon Motor Company, Hudson Motor Car Company, and the Chalmers Motor Company, all of Detroit. The smaller sizes and types of the Timken-Detroit axles now in demand on the lower priced cars will be made at the new plant, it is stated.

EDISON USES KLAXON FIRE ALARM.

The Klaxon fire alarm signal, manufactured by the Lovell-McConnell Manufacturing Com-



Klaxon Fire Alarm Mounted on Roof of Edison Laboratories.

pany, Newark, N. J., is being put to an unusual use by the Thomas A. Edison laboratories, as is shown in the accompanying illustration. It is used to summon the superintendent of reconstruction and his assistants to the manager's office, where the Klaxon button is located, and is the midnight signal for lunch hours for the night shift, and at noon. Wound for six volts and operated on 12 volts of Edison storage battery, it has been in constant service since December, 1914, without failing and without requiring any attention.

EMPLOYEES SHARE PROFITS.

Statement is made that the Studebaker Corporation, Detroit, Mich., has distributed approxi-

mately \$300,000 in sums ranging from \$250 to \$4,000 as profit shares among its department heads, superintendents, and foremen in charge of production. All participating in the plan are connected with the Detroit plants, with the exception of district managers. It is said that the corporation intends to extend its plan this year to include many of those employees who have served a long time, basing the individual proportions on the increase of production, and individual effort in the curtailment of expenses.

\$2,000,000 FROM GOODRICH CAPITAL.

Stockholders of the B. F. Goodrich Company, Akron, O., voted at the annual meeting held in New York City, March 10, to reduce the 7 per cent. preferred capital stock from \$30,000,000 to \$28,000,000, which reduces the total capital stock from \$90,000,000 to \$88,000,000. Only 3 per cent. of the original \$30,000,000 issue is called for annual retirement, according to the by-laws of the company. While the number of directors was reduced from 16 to 14, the old officials were retained in office, they being B. G. Work, president; C. B. Raymond, secretary; W. A. Means, treasurer; A. H. Lehman, chief engineer; W. O. Rutherford, sales manager; E. C. Tibbitts, advertising manager; E. C. Shaw, factory superintendent; Charles Wolf, purchasing agent.

FIRESTONE REDUCES TIRE PRICES.

The new schedule of Firestone solid truck tires, manufactured by the Firestone Tire & Rubber Company, Akron, O., provides for a net price which is 10 to 15 per cent. lower than any net prices given in previous Firestone lists after deducting discounts. Consumers' discounts are eliminated from the new schedule. E. S. Babcox, advertising manager, states that larger volume of sales, lower cost of crude rubber, an efficient distribution, and lower production cost make the reduction possible.

BIG BUSINESS FOR ATWATER KENT.

The Atwater Kent Manufacturing Works, Philadelphia, Penn., shipped 100 per cent. more ignition systems during the month of February of this year than in the corresponding month of 1914, and 14 times more than the output for February, 1913. More than 60,000 systems are said to have contracted for delivery in 1915, with prospects of very heavy further increase.

KISSEL INDORSES JITNEYS.

George A. Kissel, president of the Kissel Motor Car Company, Hartford, Wis., believes that the jitney 'bus service is only at the beginning of its career. "You will soon see the jitney idea organized and systematized," he stated recently, "and a real live competitor of the street railway. In not very many years from now you will find it largely supplanting the rails with fine, spacious motor buses that do not tear up streets or offend the eye. It's the logical thing and bound to come."

SNARR WESCO SALES MANAGER.

George W. Snarr has been placed in charge of the Wesco Supply Company's automobile accessories sales department. For the past three years he had been in charge of the company's sales territory in Central Illinois. His rise in the company has been rapid. Eight years ago he entered its employ as stock boy, advancing to counter clerk, and then to city salesman. Mr. Snarr announces that he will have a new automobile accessories catalogue ready for distribution to the trade about April 1.

OWEN MARKETING MITCHELL CARS.

Ray M. Owen, who is said to have gained considerable wealth as well as wide recognition as the sole distributor of Reo cars, until recently,



Ray M. Owen, Member of Houghton, Inc.

when the Reo Motor Car Company, Lansing, Mich., took over the selling end itself, has joined the Harry S. Houghton, Inc., New York City, as a partner, which is the eastern agency for the cars of the Mitchell-Lewis Motor Company, Racine, Wis. The Owen magnetic car, with electric transmission

which Mr. Owen has been financially interested in lately, will be handled independently in New York City.

HANDLEY GOING TO JACKSON.

J. I. Handley, president of the Mutual Motors Company and of the Marion Motor Car Company, which has been removed from Indianapolis



J. I. Handley, Head of Marion Motor Company.

to Jackson, Mich., will soon take up his residence in the Michigan city. The plant in West Indianapolis has been vacated, and the selling quarters at 430 North Capitol avenue have been left to other interests.

Statement is made that before Mr. Handley leaves Indianapolis, the prominent bus-

ness men there will tender to him a testimonial banquet. He has a wide acquaintance among the Indiana automobile men, and has been vice president of the United States Motors Company, an officer of the Maxwell-Brisco company, and president of the American Motors company.

The Marion Motor Car Company will sell to the trade four, six and eight-cylinder motor cars at popular prices, and is stated to be figuring on a 5000-a-year production.

PLAN FOR GASOLINE MANUFACTURE.

The manufacture of gasoline and chemicals used in the production of ammunition and dye-stuffs under the newly announced Rittman process will be conducted by a company under the supervision of the Secretary of the Treasury, if plans which officials of the United States Bureau of Mines are considering should prove satisfactory. One plan suggests that oil refiners cooperate in building a plant for the company, while another proposes that the sole control of the patents and the right to license financially responsible companies be vested in the Secretary of the Treasury. The full details of the Rittman process, which was outlined in the preceding issue of The Automobile Journal, will soon be announced by the Department of the Interior, it is expected.

KAUFFMANN JOINS NONPAREIL HORN.

Lincoln T. Kauffmann, for 10 years with the Motor Car Equipment Company, successors to the Bi-Motor Equipment Company, and in charge of the Boston office since its inception, has severed connections with that company to join the forces of the Nonpareil Horn Manufacturing Company, 75 Wooster street, New York City.

SCRIPPS-BOOTH CAR IN EUROPE.

The Scripps-Booth Company, Detroit, Mich., manufacturers of the low-priced car known by that name, is now making quantity deliveries. The illustration on this page shows shipment of a machine to the company's factory representative for Continental Europe, Hildaire J. Holder,



Shipping a Scripps-Booth Car, Consigned to the Company's European Agent at Naples, Italy.

consigned to Naples, Italy. Mr. Holder will travel in the Scripps-Booth car from city to city throughout Europe, securing dealers in the important centres. His itinerary includes tours to Milan, Genoa, and Sicily; then into France, Spain and Portugal. Another route will take him from Athens, Greece, through Turkey, Bulgaria, Roumania, Russia, Poland, Sweden, Denmark and Holland. While travelling through the warring nations, Mr. Holder will have safe conduct under the American flag which will fly from his Scripps-Booth car.

KLAXONET MAKES SALES RECORD.

The Lovell-McConnell Manufacturing Company, Newark, N. J., states that since its announcement on March 2, orders for the new Hand Klaxonet horn have reached a daily aver-

age of 3000. This unprecedented sale is of special significance in that it took place without any idea of what the signal would be like beyond the bare announcement that it was a Klaxon product, selling at \$4 each. The signal attracted much attention at the Boston Automobile Show, where it was on exhibition. The factory is stated to be working overtime on the new instrument so that deliveries may begin May 1, while the extensive advertising campaign being carried on is expected to bring in even a greater number of orders.

SAXON'S DOUBLE CHECK INSPECTION.

The Saxon Motor Company, Detroit, Mich., has instituted a double checking system in the plants where parts and material for Saxon cars are manufactured, which is intended to insure the quality and high grade of workmanship. While the plan involves considerable expense to the company, it is said to more than pay, by eliminating waste or loss through defects.

"If a mechanical part or a piece of material is inspected at its early stages," said C. C. Cross, the Saxon factory manager, in explanation of the plan, "and then again before it finds a place in the finished product, a quality motor car is the assured result. The inspection of our cars will not be confined to an inspection before the cars are shipped, but under the direction of the chief inspector, who is one of the most expert experimental engineers in the country, a number of deputies will be placed in the various plants where the company buys parts. All parts will be inspected before shipment to the Saxon factory. This method is a guarantee to our customers that our product is right."

A petition in bankruptcy, giving assets as about \$200,000, liabilities of \$37,000, cash at \$400, and authorized capital stock of \$3,500,000, has been filed in the United States Court, Trenton, N. J., by the Century Rubber Company, Plainfield, N. J. F. B. McDermott, Jersey City, was named receiver.

An initial dividend of 10 per cent. has been ordered for the creditors of A. H. Kling & Co., Detroit, Mich., automobile supply dealers.

DIXIE HIGHWAY PLANS PROGRESSING.

By William S. Gilbreath.*

SINCE the inception of the Lincoln highway there has been a wonderful increase in the inquiries for touring information. Last year the



W. S. Gilbreath, Originator of the Dixie Highway Plan.

Hoosier Motor Club, Indianapolis, Ind., had 10,000 inquiries pass through its office. This was inquiries of all kinds, but a very large percentage of them were requests for maps and routes to various parts of the country.

It was noticeable that with the increase in touring west and the cry "See America First", there had developed a

very large request for southern touring information. A number of people had made trips south and a very large percentage of those from points north of Indianapolis had been instructed to go in various roundabout ways. The perfectly natural scenic and historic way, using Indianapolis as a basis, would be to go from thence to Louisville, to Nashville, Chattanooga, Atlanta and from thence to Jacksonville.

Glancing at the map you will see just what an immense amount of territory such a road would tap. Another glance at the map shows the seven states north of the Ohio river with an automobile registration of 700,000 cars. Ten per cent. of these cars en tour, would mean 70,000 cars. The

average tourist carries four people, and this would mean 280,000 people.

When one considers the points of historical interest, the trip over the Dixie highway would be one continual feast in this line, to say absolutely nothing of the wonderful scenery. Leaving Indianapolis, the first point of interest is Seymour, Ind., where the big Pigeon Roost Indian massacre occurred. There is also near this point the cabin, still standing, which was used by Aaron Burr as a refuge. He lived here for some time. The Ohio river, then, is the Rhine of America. From Louisville south to Nashville, one is on historical ground practically all the time. First comes the home place of George Rogers Clark; Federal hill, where Stephen Foster wrote "Old Kentucky Home"; the grave of John Fitch, who built the first steam boat on the Ohio river; "Fondavera", the old mission house where the exiled king, Louis Phillipe of France, lived; Knob creek, where Abraham Lincoln was saved from drowning, as a boy; the Lincoln Memorial farm, where can be seen the log cabin in which Lincoln was born; Mammoth cave, the greatest subterranean wonder in the world. Everyone knows about Nashville and points around there. Between Nashville and Chattanooga there is another wonderful cave, called "The Wonder Cave



Scene on the Proposed Dixie Highway Route, Near Dalton, Ga.

of Tennessee", at Monteagle. From there on to Chattanooga is a wonderful succession of scenery. At Chattanooga and Atlanta we have

*Secretary of the Hoosier Motor Club, Indianapolis, Ind.

scenery and battlefields galore, and from there on south is one continual change which gives the motorist one of the most pleasureable trips in the country.

These people have begun to realize what it means to have travel passing through their country and have really gone about it in a practical way to attract this travel. There are a score of reasonably good hotels along the route. A great deal of very good road work has been done south of Louisville.

There are one or two counties in Tennessee where the population is so thin that it has been impossible for them up to the present time to put heavy expense on the road proposition, but they have arisen to the occasion and are planning to do an immense amount of personal work in addition to the work which is to be done by the state and counties. When this work is done the foundation will then be laid for a permanent

cess of oiling that has been adopted, these roads which have been so treated are almost like asphaltum.

St. Augustine has started in by laying a brick highway from their north to the south county lines. This will connect up with Jacksonville. North of Jacksonville, between there and Macon, there are some wonderfully fine stretches of road built of chert, and as they are well drained, they make a very fine hard surfaced roadway. Strenuous efforts are being made to have the states of Georgia and Florida unite in an effort to build permanent roadways through sandy and swampy lands.

When the subject was first broached to Clark Howell of the Atlanta Constitution, he accepted it as a good thing and considered that such a road would be a wonderful boon to the south. There is no question but that the tourist leaves a string of money behind him. This is all new



Typical Scene in Florida, Showing Road Running Through Palm and Orange Grove in Dayton, a Section of the Dixie Highway Route.

continuous, connected highway between Chicago and Miami, Florida.

The moment that this subject was broached the people in Florida wished to have the road terminate farther down in the state, and the east coast particularly has started a great deal of work on this score. Dade county, Florida, in which Miami is located, has now before the people a proposition for \$100,000 bond issue, with which to treat 60 miles of road from the north county line to the south county line. This county has practically been the first one to do any work on connecting up with Jacksonville and the south. Recently some automobilists from Miami travelled over the road between there and Palm Beach, 72 miles, and found it in excellent shape. They are using the corral rock for this purpose, and this makes a hard, permanent surface that does not wear away easily. With the new pro-

money for the south.

By taking the above figures and approximating the number of tourists who would travel in that direction during the fall and winter, and who would return in the spring, it can easily be seen that this would mean an immense amount of money for the south, which, according to the most reliable information, would be well distributed amongst various industries.

Mr. Howell immediately took it up and, through his good work and the work of the Chattanooga Automobile Club, it was decided that it would be advisable to try and interest the governors of the various states through which the road would travel, to meet at a given point and discuss the feasibility of the road, effect an organization to assist in the building of the road. To this end the invitation was extended by Governor Ralston of Indiana, to Governors Dunne

of Illinois, McCreary of Kentucky, Rye of Tennessee, Slaton of Georgia and Trammell of Florida, to meet in Chattanooga on April 3rd. All of these governors have accepted the invitation, and the tentative organization, through the Chattanooga Automobile Club, has extended invitations to prominent people throughout the country to attend. Acceptances have been had from Adolph Ochs of New York City, Fairfax Harrison of Richmond, Va.; A. R. Pardington of the Lincoln Highway Association, A. G. Batchelder of the American Automobile Association and many other prominent people.

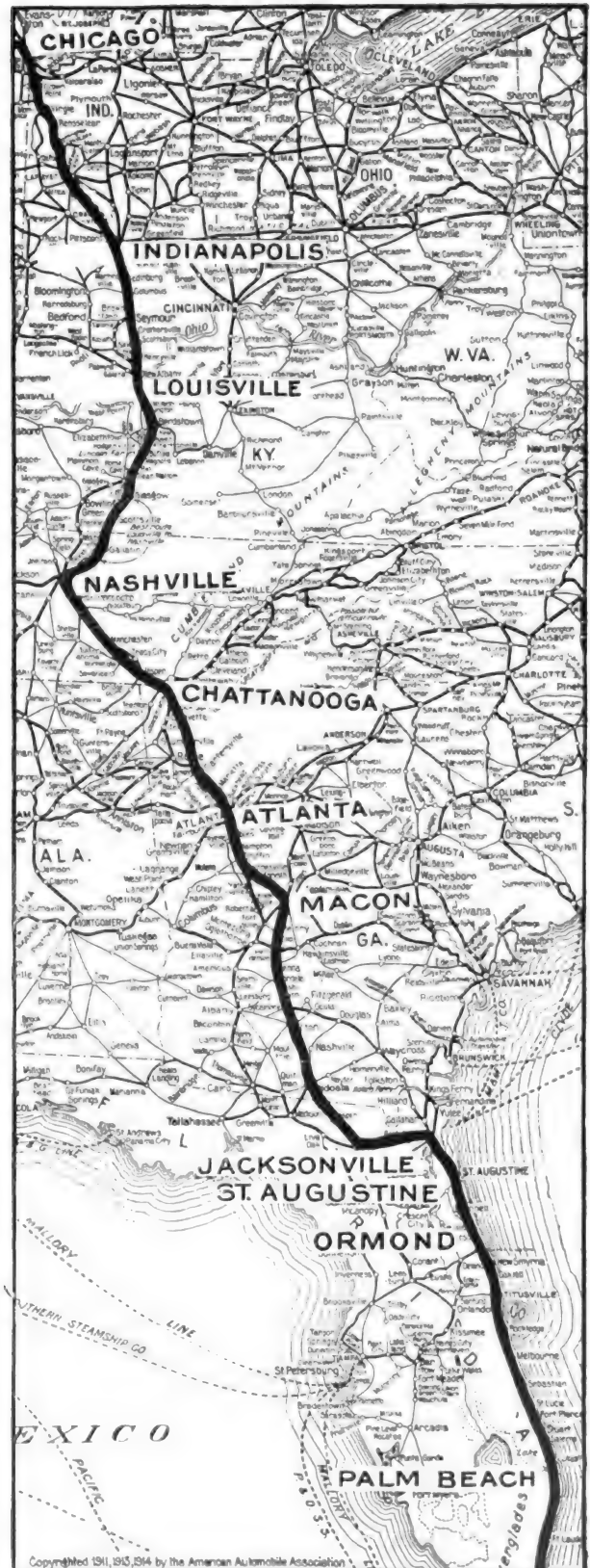
There are several contenders for this highway. C. E. James of Chattanooga plans to build through his own initiative a road 60 miles long over Waldron's ridge, which road would be the main road leading direct to Louisville and would cut out Nashville. This would make the road 131 miles shorter, and as he proposes to build his stretch entirely of concrete, it can easily be seen what a wonderful thing this would be, in addition to which it would travel along the edge of this wonderful scenic ridge with no greater grade than three per cent.

On April 3 a permanent Dixie Highway Association will be formed, officers elected and the board of directors will then choose the route of the highway. A movement has been started by some of those interested, in addition to making this a national highway, to make it instructive as well, and by lining it with shade and fruit trees indigenous to the various sections, the road will be instructive and beautified as well.

There has been no suggestion for a roadway in the south which has met with as great popular enthusiasm as this one, and it is safe to say that it will be a greater factor in drawing the people of the North and South more closely together than anything which can be thought of just at the present moment.

On the first night on which the Denver, Col., ordinance prohibiting the use of glaring headlights was in force, 70 arrests were made, and the police have strict orders to continue to apprehend all who are found violating its provisions.

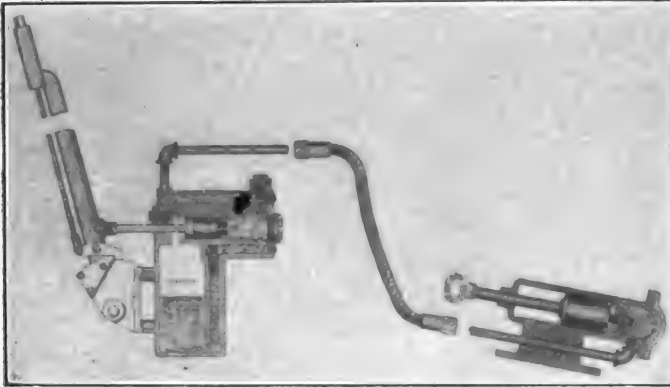
The Illinois state court has declared unconstitutional the automobile wheel tax levied by the city of Lincoln, and an appeal has been filed. The similar Chicago ordinance, which has been upheld, may be decided invalid by the appellate court.



Map of the Dixie Highway.

KNOX FOUR-WHEEL TRACTOR.

AMONG the several unusual features of the Knox four-wheel tractor, model 35, manufactured by the Knox Motors Company, Spring-



Hydraulic Brake of the Knox Model 35 Tractor, Showing Its Operation by a Hand Lever from Driver's Seat.

field, Mass., is the use of a hydraulic emergency brake, illustration of which appears on this page. Another feature of this machine, the capacity of which is rated at 10 tons, is the specially designed motor which, when adjusted for a predetermined speed, is regulated without the use of a governor, so that further increase of engine speed will cause diminished rather than increased power.

Unlike the Knox company's former tractor types with three wheels, known as the Martin and Knox-Martin machines, model 35 has four wheels. It also differs in chassis construction in that the frame is not mounted on springs fixed on the rear axle, but is coupled with it by two radius rods that rotate on collars on the axle, the forward ends being pivoted to compensate lateral stress or movement. Two cantilever springs support the short chassis frame, the rear ends of the springs being carried in guides under the rear axle, which design is expected to

prevent side pressure upon the springs, the axle alignment being preserved by the radius rods. The tractor is driven by side chains from the jackshaft to the rear wheels.

The turntable, which is a full circle of large diameter which carries the forward end of the trailer, is carried upon two heavy semi-elliptic springs mounted on the rear axle. Thus the tractor and its trailer is practically a six-wheeled vehicle which is steered by the front wheels, and whose load is largely borne by the rear wheels shod with steel tires.

The engine is a four-cylinder, water cooled vertical, I head type, with cylinders cast in pairs with water jacket integral, having bore of five inches and stroke of $5\frac{1}{2}$ inches, which will develop 40 horsepower by S. A. E. rating. Accessibility to motor parts is fully provided for the engine is suspended at three points. Lubrication is by a high-pressure forced feed system. The water cooling of the exhaust is promoted by the exhaust manifold being carried down in front of the motor where it is exposed to the air drawn through the radiator. The Mea magneto and a Bijur starting and lighting system are used, the magneto, carburetor, starting motor and genera-



Heavily Loaded Knox Model 35 Tractor with Trailer of 10-Ton Capacity, During a Demonstration in New York City.

tor being mounted on the motor 31 inches from the ground, which height will permit the vehicle to travel through 30 inches of water, if ne-

cessary. The starting motor operates by moving a pinion into mesh with a gear cut in the rim of the flywheel.

The clutch is the largest size of the three-plate disc type. Three forward speed ratios and reverse are afforded by the selective type sliding gearset, which is very heavily built. It is assembled as a unit with the jackshaft, which is mounted just ahead of the rear frame cross member in large brackets and is a very heavy full-floating construction. An interlocking differential lock, which is operative by a heel button in the foot-board in front of the driver's seat, is incorporated with the gearset. Because of the interlock the differential cannot be used except when the gearset is in neutral after locking any speed ratio may be used.

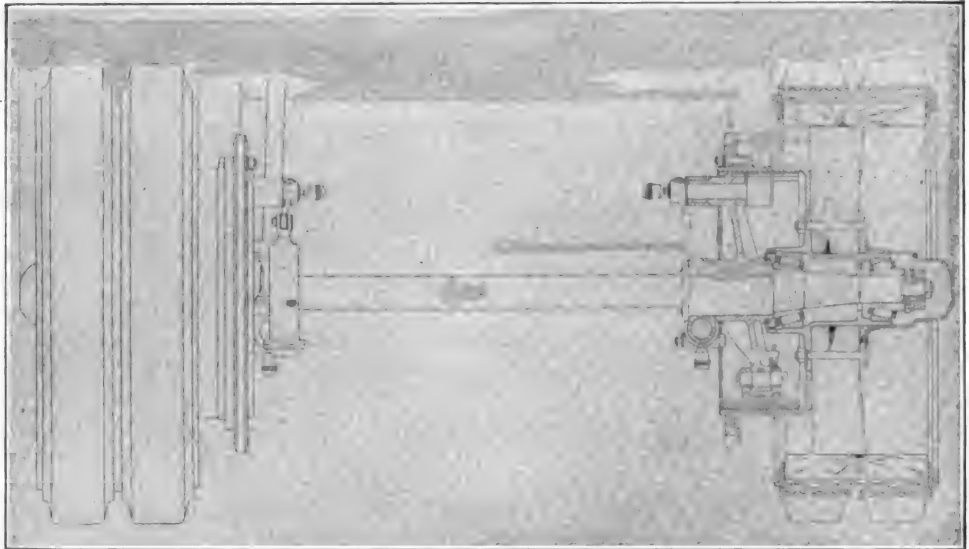
Full cantilever springs extend under the frame side members where they are shackled, to the end of the chassis, to which they are pivoted, and then to guides under the rear axle. The springs on the front and rear axles are semi-elliptic. The rear axle is a rectangular section steel drop forging, and the front axle is an I section. The lower circular plate of the turntable on which the forward end of the trailer is carried, is supported on the rear axle platform.

The upper half of the circle has a stud that serves the same purpose as the kingbolt of wagon construction. The platform is balanced perfectly by the trailer, but when driven without a trailer is balanced by a drawbar. The wheels are wood, artillery type, having single band solid tires forward, and dual rear. Forward tread is $57\frac{3}{8}$ inches, and the rear is $55\frac{1}{2}$ inches. The wheelbase is $108\frac{1}{2}$ inches. Road clearance under the front axle is $10\frac{1}{2}$ inches.

Drive is at the left, and the steering gear is constructed with very heavy linkage. Gear-shifting and emergency brake levers are in the centre, while the service brake is operated by a foot pedal by which contracting iron shoes of the locomotive type act on cast steel drums on the

jackshaft. The service brake can be automatically locked if desired.

Special attention is called to the novel design of the emergency brake, which is hydraulic. The lower end of the brake lever, which has a latch for release and set, is pivoted on a bracket bolted on top of the gear shifting mechanism housing. By referring to the illustration accompanying, one will see that by pulling the brake lever backward, a slidable piston forces oil from the cylinder through an outlet into piping and back to two cylinders mounted upright on the rear ends of the radius rods. In these cylinders are pistons that are connected with the shafts that turn the cams which expand the brake shoes within the steel drums on the rear wheels. This brake affords great power, which, in a sense, is cushioned, so that braking may be as delicate as the



Elevation of the Rear Axle, Showing Upright Cylinders of Hydraulic Brake System Attached to the Radius Rods, and Section of Brake and Wheel.

driver desires. The system is thoroughly enclosed and leak proof, and constant lubrication prevents wear. Raybestos is used to face the brake shoes. It is said that the brake has sufficient power to hold the tractor on a heavy grade.

Additional features of the Knox model 35 are the rapidly compounded power through gear and chain reductions and the interchangeability of parts which will increase the speed to 35 miles an hour when required for fire apparatus.

The standard equipment consists of a cab with side curtains, electric dash and tail lamps, swinging searchlight, storage battery, mechanical horn, fire extinguisher, speedometer, two heavy jacks for lifting the trailer, the trailer platform, and the usual tool equipment.

FIGHTING REGISTRATION BILL.

THE proposal to double the registration fees for motor vehicles in New York State, made in the Hewitt-Sullivan bill, now pending in the legislature, has raised a storm of protest. The attitude of some of its opponents is explained by R. H. Johnston, president of the Automobile Dealers' Association of New York City, who said recently:

"Our position has always been that the use of the highways is a natural common-law right, and the legislature cannot single out any one class of users of the highways for taxation, and let the other classes of users escape taxation. We have always contended, and still contend, that any registration fee which is in excess of the cost of maintaining the bureau or department which does the work of registration is unconstitutional.

"The Hewitt-Sullivan bill increasing the fees would probably not stand a test in any court. According to the terms of the bill, the amount of taxation on any given motor vehicle is based upon six different considerations, namely; first, the horsepower rating; second, whether the motive power is gasoline or electric; third, whether or not the vehicle is used for commercial purposes; fourth, whether the load consists of passengers or freight; fifth, the weight of the machine; sixth, whether or not the machine is four years old. Not one of the six factors mentioned has been considered by the courts as a proper basis for determining taxation. As our counsel, Charles Thaddeus Terry, pointed out to the legislative committee, the automobile laws have been declared unconstitutional in Ohio, Florida, Michigan, and other states on points similar to those incorporated in the proposed legislation.

"Under the law now on the statute books, the state received in 1914, \$1,529,842 from automobile license fees. Viewing the matter solely from the point of view of revenue to the state, it would seem obvious that the most sensible way to increase this revenue is to encourage the use of motor vehicles and not discourage their use."

AUTOISTS LIABLE FOR ASSAULT.

An automobile driver in New Jersey, who drives at an excessive speed and runs down a person may be indicted for assault and battery, according to an opinion handed down recently in Jersey City by the New Jersey supreme court. "It requires neither argument nor illustration".

read the opinion, in part, "to show that the excessive rate of speed at which an automobile is driven is a product of the will of the driver and not the result of his mere inattention or negligence". Many autoists profess to see a hardship in the ruling, if it is affirmed. Commissioner Job H. Lippincott of the Department of Motor Vehicles, is said to hold the opinion that the present speed limits of 12 and 25 miles should be increased to 15 and 30 miles, and that, whatever the limit fixed, the existing law must be enforced strictly if motorists are to be held responsible for a crime merely because they exceed the prescribed limit.

TAX FOR WASHINGTON'S TRUCKS.

Private automobile trucks in the State of Washington are to be taxed from \$10 to \$25 a year according to capacity, as provided by the state legislature. This rate also applies to motor stages running through the rural districts, while trucks for hire will be taxed from \$20 to \$50 per annum.

MISSOURI'S MOTOR LAW DEFINED.

Motorists in Missouri are required to stop their machines when horses or mules are alarmed by them only on signal from the drivers of the animals themselves, according to a recent decision of the court of appeals at St. Louis, Mo., in a case wherein the father of a driver, the latter being engaged in curbing his animals, gave the signal. It was suggested that new legislation was necessary to correct what is claimed to be a defect in the law.

ANNUAL AFFIDAVITS NOT NEEDED.

According to a ruling of Charles D. Burnes, secretary of state of Connecticut, it is only necessary for the beginner to secure an affidavit as to his ability to drive an automobile. He states that each annual renewal of a license does not make necessary a renewal of the affidavit. In Connecticut, when a person makes an original application for an operator's license, the affidavit must be sworn to before a commissioner of the court, or notary public by a licensed operator who knows the person in question to be qualified to operate a motor car.

REFINEMENTS OF MARMON NEW MODEL.

THE new Marmon "Forty-One", built by the Nordyke & Marmon Company, Indianapolis, Ind., represents a most carefully developed



New Model Marmon "Forty-One" Which Has Several New Body and Motor Features.

type of six-cylinder car, being unusually powerful and extremely smooth and flexible in operation. Several qualities of Marmon design which have become standards with the designers of high-grade cars are continued in this new Marmon six-cylinder.

The motor is distinctively Marmon design and construction, being a water cooled, six-cylinder, L head type, the cylinders being cast in blocks of three with enclosed valves, having cylinder bore of $4\frac{1}{4}$ inches and stroke of $5\frac{1}{2}$ inches, which develops 43.3 horsepower according to S. A. E. rating. The motor is mounted on three-point suspension, designed to afford frame flexibility and prevent distortion strains, and the transmission gearset is the Marmon selective type sliding gear construction, contained in a dust proof, oil tight aluminum case mounted centrally on three points and having three forward speed ratios and reverse.

Though the most expensive construction, the Marmon crankcase is a one-piece aluminum alloy casting of barrel type in which the crankshaft with seven main bearings and camshaft are inserted from the forward end. This is said to give maximum strength with minimum weight. Mounting the camshaft in a closed tunnel is a new Marmon feature, which not only makes for perfect lubrication, but adds

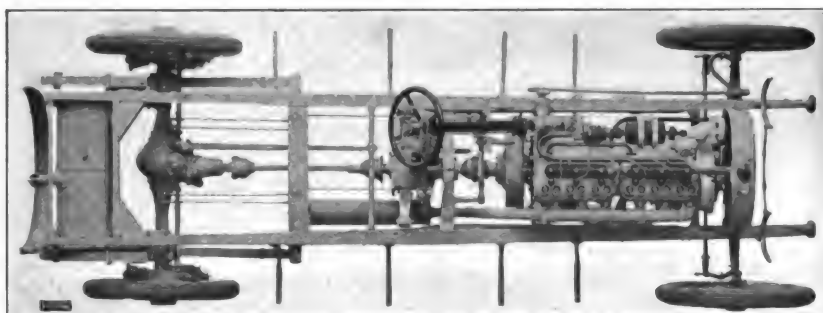
smoothness to motor operation and to longevity. Another innovation is the oiling system, the oil ducts being formed in the casting itself and thus obviating the likelihood of broken connections and leaking pipes. Oil is forced through the ducts from the motor base by a gear pump, and is thoroughly distributed.

The ignition system is a Bosch high-tension magneto and storage battery, with Bosch water proof spark plugs. A feature is that by removing of key from ground switch the ignition system is effectively locked.

The engine starting system consists of a Bosch electric motor starter, having gear engagement with the flywheel, and lighting is by a Bosch dynamo, which lights the headlights, side, tail, dash and inspection lamps. The equipment also includes a Bosch switch with voltmeter and ammeter, and a Bosch L B A storage battery, which is placed under the front seat.

The clutch is a cone type, of aluminum, faced with asbestos fabric. The engagement relief springs are within the cone of the flywheel and consist of five circular spring-steel discs set in recesses. A large ball bearing release collar is used for operating the clutch, and an automatic adjustable brake controls the clutch speed, insuring smooth shifting of gears.

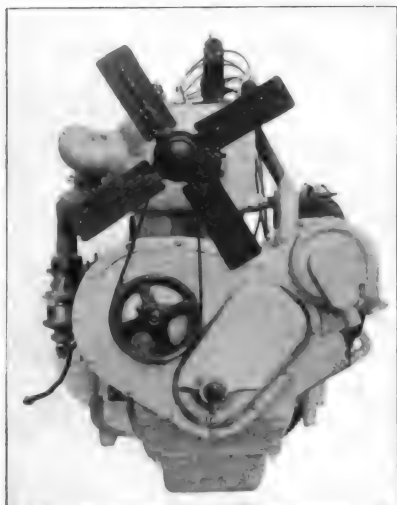
Like the motor, the transmission gearset case is mounted on three points, which afford flexible



Chassis View of Marmon "Forty-One," Showing the Power Plant and Transmission.

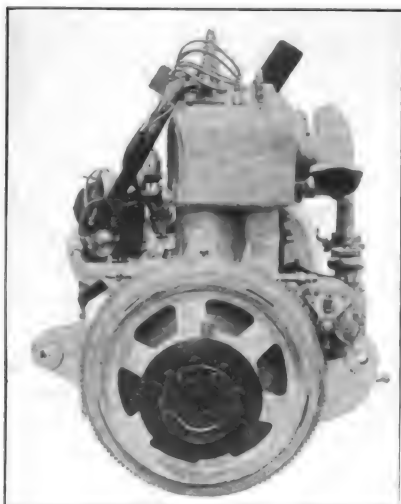
support and sloping slightly to the rear. Being centrally located, it is easily accessible either through the floor board in front, or it may be

quickly removed from the chassis by dropping it down without disturbing the body. The driving shaft is a straight line from the crankshaft of the motor to the bevel gears in the rear axle, having three universal joints that are enclosed in oil tight, dust proof housings.



Front View of New Marmon Motor.

The rear axle is a full floating type. Some features of axle design first used in Marmon cars, and incorporated in the Marmon "Forty One," includes the pressed steel housing, with a bevel gear differential, easy of access through an opening in the axle housing at the rear. The differential is mounted on conical roller bearings, and the wheels also revolve on conical roller bearings on the axle housing, being driven by the floating axle shafts, which have integral jaw clutches at the outer ends, which mesh with recesses in the wheel hubs. No load is carried on the shafts.



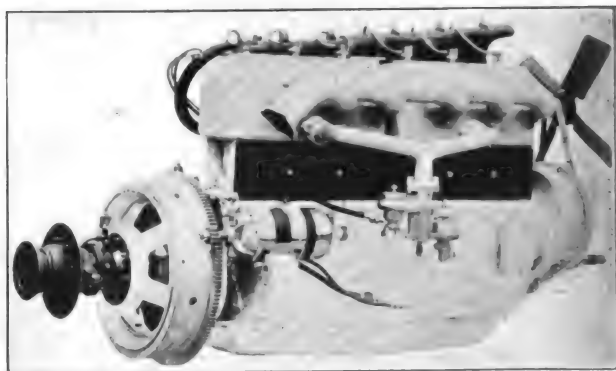
Starting Motor and Flywheel in Mesh.

The steering gear is an irreversible worm and worm wheel type, having large bearings with ample provision for lubrication. The drive is at

the left side, with centre control levers. The throttle and ignition spark control levers and the horn push button are located on the 18-inch steering wheel, the levers being held by friction, a method first used on Marmon cars and now generally adopted. The clutch is operated by the left foot pedal. The service brake is operated by the right foot pedal, and the emergency brakes by a hand lever. The car is provided with a foot accelerator.

The dash board is equipped with an oil gauge, which shows the pressure of the oil system, the Bosch voltmeter and ammeter in combination with the light switch, the speedometer and clock, all of which are mounted flush in a mahogany board set within the cowl of the dash. The equipment is illuminated by an electric light.

The body is constructed to obtain the latest streamline effect, is free of all molding, and of the convex curve type. The material used is a substantial sheet metal.



Side View of Marmon Six-Cylinder Motor in Which Oil Ducts Are Cast Integral.

The wheels are a wooden artillery type, with interlocked spokes, the rims being quick detachable. Goodrich Silvertown Cord standard tires are supplied, an extra tire being carried in a single tire carrier at the rear of the car. The wheel-base is 132½ inches, the tread 56½ inches, and the clearance 10 inches.

A one-man pantasote cape top is included in the equipment, the front end being supported on the windshield, which in turn is self-supporting without braces upon the dash cowl.

John L. Milton, formerly of the Remy Electric Company, Anderson, Ind., has been elected president and general manager of the Motor Ignition and Devices Company, Detroit, Mich., which was recently formed. The company will manufacture ignition apparatus for motor cars and other electrical devices.

ENDLESS CHAIN FOR SAXON FACTORY.

The Saxon Motor Company, Detroit, Mich., is increasing its production by the installation of an electrically driven endless chain in the assembling departments of its plant. This chain will carry the machines through the different stages of assembling from the time the cars are nothing more than frames, axles and sets of wheels until they are ready to be driven to the loading platforms. The speed of this chain apparatus may be varied to suit production requirements. One novel feature is that the cars will run on their own wheels from the start of assembling until they are ready for shipment.

This increase of production is due chiefly to the demand for the new roadster and six-cylinder models, an output of 25,000 cars being planned for the year. The new factory which the Saxon Company has taken is so laid out that the installation of this continuous chain apparatus is in every way practical. The assembly buildings are one story, so that the conveyor system can be worked more efficiently than if the factory were tried in a two or three-story structure.

Another interesting economy just adopted at the Saxon factory is the use of specially built tractors for hauling materials. The tractors are equipped with trailers and operated by Saxon motors. Each morning these tractors and trailers are loaded with parts for the different departments. Each load comprises the exact number of parts to be used by a department in the day's production. The materials are hauled from a central stock room.

HUMPHREY BACK FROM BERMUDA.

S. H. Humphrey, manufacturing manager of the Hupp Motor Car Company, Detroit, Mich., who has been in Bermuda for the past month, has returned to Detroit to resume his active duties. Mr. Humphrey has been recuperating from an attack of malaria.

AUTOMOBILE MEN ORGANIZE.

A business men's association, composed of automobile dealers and proprietors of garages, was organized recently at the Sinclair Inn, Portsmouth, N. H. The organization will comprise members from Portsmouth, Dover, Rochester, Exeter, Somersworth and Newmarket. The officers elected were: J. W. Edwards, president; Clifford Loud, secretary and treasurer. A committee of three, Charles E. Woods,

Albert Wetherell and George C. Welsh, was appointed to establish by-laws for the association. A banquet followed the meeting and plates were set for 25.

SAYS RUSSIA ORDERED 1000 WHITES.

According to reports received from Cleveland, O., the White Company of that city has received orders for 500 two-ton and 500 three-ton trucks for the Russian government. The White Company, however, maintains strict secrecy regarding any foreign government orders.

Hugh Chalmers has been elected president of the Detroit Athletic Club for the third successive term. Other officers elected are: Henry B. Joy, first vice president; Emory W. Clark, second vice president; Julius H. Haass, treasurer, and Charles A. Hughes, secretary. The date of the opening of the club house has been set for April 3.

After being at 132 North Broad street, Philadelphia, Penn., four years, the Overland Motor Company has removed its quarters to its new building at Broad and Wood streets. The new structure is three stories high and affords 55,000 square feet of floor space.

The Knight Tire and Rubber Company, Canton, O., has opened a wholesale department in New York City, at 215 West 51st street. The wholesale department is separate from the retail store for the sale of Knight tires, the latter being located at 52nd street and Broadway.

The automobile body building plant of Moore & Munger, New York City, has been purchased by the Universal Auto Painting Company. The latter concern will carry on the body building work and will also do general repairing and painting.

A final dividend of 8.17 per cent. will be paid to the creditors of the S. & M. Motor Company, Detroit, Mich., according to an order issued by Lee E. Joslyn, referee in bankruptcy.

The new Ford building in Montreal, Canada, has a big concrete track on the roof which will be utilized for demonstrating purposes.

The United States Wheel and Tire Company, Rockton, Ill., will break ground for its new factory March 1.

FEDERAL HEAVY DUTY TRUCKS.

FIRST building a 3000-pound truck with the worm drive system of propulsion, the Federal Motor Truck Company, Detroit, Mich., almost immediately began work upon a 7000-pound vehicle of similar design. The last named type, known as model L, is designed to meet the extreme requirements of heavy haulage, and it has all the qualities that experimentation determined were necessary or desirable. It is built in four chassis lengths, each being designed by the loading space length in feet behind the driver's seat, as follows: L-10, L-12 (which is the standard), L-14 and L-16.

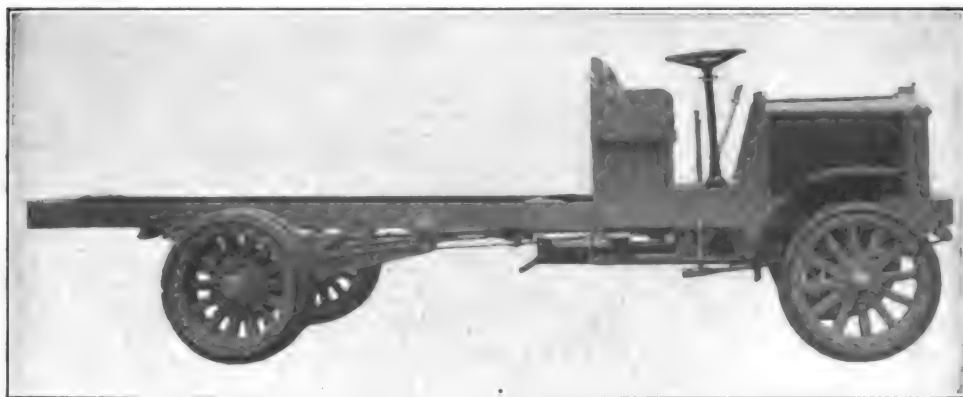
Simplicity of construction, accessibility of all working parts, complete protection of the power plant and the worm drive system are the notice-

gas in the intake manifold regulates the motor, whose maximum speed is 12 miles an hour at 1160 revolutions a minute.

A multiple disc type clutch, composed of 13 steel plates faced with Raybestos, is operated with triple clutch springs. The clutch is entirely enclosed, the discs not being lubricated. The gearset is of the selective type, with three forward speeds ratio and reverse.

The main shaft of the gearset is coupled to the driving shaft by a universal joint, and the driving shaft is in two sections, the forward section being supported by a self-aligning annular ball bearing mounted on a frame cross member. The second section of the driving shaft extends back to the worm shaft of the rear axle, with universal joints at either end.

The rear axle is a Timken-David Brown full-floating design, in which the load is carried on the axle housing. The axle case is made up of three sections. The centre section is a steel casting with large top opening that is closed with a cover plate which carries the worm



New Federal Model L 7000-Pound Worm Driven Truck, Designed for Heavy Haulage.

able feature of the Federal model L truck. The power plant is a complete unit, suspended in a sub-frame carried at three points.

The motor is a Continental model E, four-cylinder, water cooled, vertical L head type, with cylinder units cast in pairs; with bore of $4\frac{1}{2}$ inches and stroke of $5\frac{1}{2}$ inches, it is rated by the S. A. E. formula at 32.40 horsepower, but is said to develop over 40 horsepower at the maximum motor speed, which is 1160 revolutions a minute.

The cooling system is by a circulation of water forced through liberal connections with a specially built radiator by a large double-bearing centrifugal pump. A ball bearing mounted fan assists the cooling. Lubrication is the force feed and splash system. Ignition is by a water proof, high-tension magneto that has a fixed spark, and the fuel is carburetted by an automatic float feed carburetor. An automatic governor, enclosed and sealed, that is controlled by the velocity of

shaft, its bearings, the gear wheel and the spur gear differential gearset assembled with it. When this unit is once adjusted the only further attention necessary is for lubrication. The other two sections are bolted rigidly on either side of the centre section, and carry the spring seats and brake spiders integral.

The driving shafts in the rear axle are forged integral with the flanges, which are bolted on to the wheel hubs. The other shaft ends are splined and mesh in the differential gears. Timken roller bearings are used in the wheels, which are of wood, artillery type, and equipped with single solid band tires in front and dual band tires in the rear. The standard model, L-12, has a wheel-base of 146 inches, with tread of $66\frac{1}{2}$ inches forward and $67\frac{3}{4}$ rear.

The springs are a semi-elliptic type, of vanadium steel, the rear set being outside of the frame and shackled at both ends.

MAXWELL CAR WINS AT VENICE.

DRIVING a Maxwell car, equipped with Firestone tires, Barney Oldfield finished first in the 300-mile racing contest at Venice, Calif., March 17. Thirty-four seconds later another Maxwell plunged across the finishing line with Billy Carlson at the wheel. Third in position was Ruckstell, piloting a Mercer, while fourth place was won by John Marquis in a Bugatti. The official time as was given: Oldfield, 4h. 24m. 9.4s.; Carlson, 4h. 24m. 43.6s.; Ruckstell, 4h. 27m. 27s. Oldfield's average time was announced as 68½ miles an hour, which rate exceeds that made by Resta in either the Grand Prize or Vanderbilt Cup races at the Panama-Pacific Exposition.

A remarkable feature of the race was that the winning Maxwell completed the 300 miles without once stopping or changing gears, while the second Maxwell stopped only once, for a period of seven seconds to replenish the oil supply. These facts are especially noticeable, for they show remarkable endurance of the Firestone tires used on these cars. The course driven over was two miles, surfaced with macadam and plank-ing, and there were 291 right angle turns which Oldfield and Carlson took at high speed during the 300 miles.

Nineteen cars were entered and only six finished, with one casualty in which Marquis, while going at 70 miles an hour, struck an aged spectator and severed his left leg.

Oldfield's finish was spectacular. Fifth in position at the 92d lap, he forged ahead when Dave Lewis, in a Stutz, and Eddie Hearn, driving a Case, were forced to stop by engine trouble. At the 97th lap he was in the lead, with Carlson following close behind.

A. A. A. SANCTIONS GALESBURG RACE.

The Galesburg District Fair Association announces that the American Automobile Association has issued its sanction for a 200-mile automobile race to be held at Galesburg, Ill., on June 9, 1915, for a purse of \$5000. The track is regarded by many racers as one of the fastest and

safest mile dirt courses. The promoters expect that several leading American drivers will participate.

THOMAS LACKS A RACING CAR.

Rene Thomas, who recently cabled his entry for the next Indianapolis 500-mile race, is having a difficult task in securing a car for the contest. Thomas and his confrere, Bablot, considered the only rivals in Europe to the great Boillot, are attempting to close negotiations for either a couple of Delages or Peugeots, but have had no success to date. Speedway officials here are endeavoring to save the situation by placing



Barney Oldfield in the Maxwell with Which He Won the Grand Prize Race at Venice, Calif.

Thomas and Bablot in touch with E. Grua, builder of Clement-Bayard cars at St. Etienne, who recently wrote he had built three machines especially for the Indianapolis race, but could find no drivers, because of the war. One of these cars suffered destruction at Liege.

CHALMERS MANAGERS IN CONVENTION

A convention of district managers of the Chalmers Motor Car Company, Detroit, Mich., was held recently, and a "get-together" day, instruction day and service day was celebrated. Among those who addressed the convention were Hugh Chalmers, president of the company; Lee Howell, general manager; George W. Dunham, consulting engineer; C. C. Hinkley, chief engineer; H. H. Pinney, factory manager, and A. B. Hansom, service manager.

AMERICAN AND EUROPEAN RACING RECORDS.

WHILE the speed in miles an hour attained in the two opening events of the 1915 automobile racing season, for the Grand Prize and Vanderbilt Cup, held at the Panama-Pacific Exposition, San Francisco, Feb. 27 and March 6, did not exceed that of many other similar events in this country and abroad, there are, considering the conditions in which the races were run, several remarkable features that will be hard to beat in the coming races of the season.

Never before in the history of automobile racing has a course for an international race ever been with such short laps (each measured less than four miles), and with two sharp right angle turns. Never before was a classic event run through such thronging streets as at the exposition grounds, within which the course was laid.

And seldom before had racing automobile drivers so much endangered their lives, because of the rain and slippery tracks, as they were in the Grand Prize race.

The course was over macadam and planking, for the first time in a classic event in the United States, and parts of it became a mire of mud in which the cars skidded into hay bumpers at turns so frequently that the spectators became indifferent to these dangers. Despite these conditions, the winner, Dario Resta, averaged approximately 57½ miles an hour for the 104 laps necessary to make the 400 miles. In the Vanderbilt Cup race the same driver, over the same course, but under ideal conditions, made an average speed of 67.3 miles an hour for 300 miles.

That Resta can make better time is evident

TABLE OF WORLD'S RECORDS.

The following compilation gives the speed records established in the past nine years of automobile racing, both in this country and Europe, the names of the drivers, cars, courses and rates on which the records were made.

STRAIGHTAWAY FREE-FOR-ALL RECORDS, REGARDLESS OF CLASS.

Miles	Time	Driver	Car	Place	Date
*1.....	15.88.....	Burman	Blitzen-Benz	Daytona.....	April 23, 1911
1.....	25.40.....	Burman	Blitzen-Benz	Daytona.....	April 23, 1911
1.....	25.20.....	Tetzlaff	Benz	Saldura, Utah.....	Aug. 12, 1914
2.....	51.28.....	Burman	Blitzen-Benz	Daytona.....	April 23, 1911
5.....	2:34.....	Hemery	Darracq	Daytona.....	Jan. 24, 1906
10.....	5:14.40.....	Bruce-Brown	Benz	Daytona.....	Jan. 24, 1906
15.....	10:00.....	Lancia	Flat	Daytona.....	Jan. 29, 1906
20.....	13:11.92.....	Burman	Bulck Bug	Jacksonville.....	Mar. 30, 1911
50.....	35:52.31.....	Burman	Bulck Bug	Jacksonville.....	Mar. 28, 1911
81.65.....	1:00:00.....	Disbrow	Special	Jacksonville.....	Mar. 28, 1911
100.....	1:12:45.20.....	Bernin	Renault	Daytona.....	Mar. 6, 1908
150.....	1:56:18.....	Disbrow	Special	Jacksonville.....	Mar. 30, 1911
200.....	2:34:12.....	Disbrow	Special	Jacksonville.....	Mar. 31, 1911
300.....	3:53:33.50.....	Disbrow	Special	Jacksonville.....	Mar. 31, 1911

STANDING START.

1.....	40.53.....	Oldfield	Benz	Daytona.....	Mar. 16, 1910
--------	------------	----------	------	--------------	---------------

CLASS "B" CHASSIS STRAIGHTAWAY RECORDS.

161 TO 230 CUBIC INCHES.

5.....	4:24.13.....	Towers	Warren-Detroit	Jacksonville.....	Mar. 29, 1911
10.....	9:10.52.....	Wilson	Warren-Detroit	Jacksonville.....	Mar. 30, 1911

231 TO 300 CUBIC INCHES.

10.....	8:16.35.....	Towers	Cole	Jacksonville.....	Mar. 29, 1911
---------	--------------	--------	------	-------------------	---------------

301 TO 450 CUBIC INCHES.

*1.....	26.75.....	Merz	National	Jacksonville.....	Mar. 29, 1911
1.....	40.32.....	Wilcox	National	Jacksonville.....	Mar. 30, 1911
5.....	3:56.82.....	Wilcox	National	Jacksonville.....	Mar. 29, 1911
10.....	8:03.97.....	Merz	National	Jacksonville.....	Mar. 30, 1911

SPEEDWAY RECORDS, REGARDLESS OF CLASS.

Miles	Time	Driver	Car	Place	Date
¼.....	8.16.....	Burman	Blitzen-Benz	Indianapolis.....	May 29, 1911
½.....	15.03.....	Chassagne	Sunbeam	Brooklands, Eng.....	Mar. 19, 1914
*1.....	21.40.....	Burman	Blitzen-Benz	Indianapolis.....	May 29, 1911
1.....	29.02.....	Chassagne	Sunbeam	Brooklands, Eng.....	Mar. 19, 1914
2.....	60.31.....	Chassagne	Sunbeam	Brooklands, Eng.....	Mar. 19, 1914
4.....	2:33.37.....	Bragg	Flat	Los Angeles.....	May 5, 1912
3.....	1:54.83.....	Bragg	Flat	Los Angeles.....	May 5, 1912
5.....	1:57.78.....	Chassagne	Sunbeam	Brooklands, Eng.....	Mar. 19, 1914
10.....	6:35.62.....	Robertson	Simplex	Los Angeles.....	April 9, 1910
15.....	10:25.17.....	Hearne	Benz	Indianapolis.....	July 4, 1910
20.....	14:06.72.....	Hearne	Benz	Indianapolis.....	July 4, 1910
25.....	18:22.60.....	Tetzlaff	Lozler	Los Angeles.....	Mar. 29, 1911
50.....	27:40.87.....	Chassagne	Sunbeam	Brooklands, Eng.....	Oct. 19, 1913
75.....	54:50.20.....	Goux	Lozler	Los Angeles.....	Mar. 19, 1911
100.....	55:36.55.....	Chassagne	Sunbeam	Brooklands, Eng.....	Oct. 10, 1913
150.....	1:25:15.94.....	Chassagne	Sunbeam	Brooklands, Eng.....	Oct. 10, 1913

from the records he has established in foreign races. The accompanying compilation, which covers a period of nine years, gives the records established in automobile racing, and under the head of "World's Records—Foreign" Resta is credited with several remarkable accomplishments, in company with his team mates, Lee Guinness and M. Chassagne.

The record for the Vanderbilt Cup is held by Ralph de Palma, he having driven 294 miles at Santa Monica, Cal., last year at the rate of 75.6 miles an hour. The first Vanderbilt Cup race, run in 1904, on Long Island, was won by Heath in a Panhard at the average rate of 52.2 miles an hour. In the next year, Victor Hemery, in a Darracq, averaged 61.5 miles. The speed was again increased in 1908 on Long Island when Henry Robertson, driving a Locomobile, won at the rate of 64.3 miles. In 1909 the rate of speed fell to 62.8 miles per hour, when Harry Grant won in

a six-cylinder Alco. In the following year Grant repeated, increasing his hourly speed to 65.18 miles. Savannah, Ga., was the scene of the next Vanderbilt contest, in 1911, where Mulford, in a Lozier, won at a rate per hour of 74.07 miles. De Palma took the next event, in 1912, at Milwaukee, Wis., driving his Mercedes 299 miles at an average hourly rate of 68.97 miles. Plans for a Vanderbilt Cup competition at Savannah in 1913 failed at the last moment. The classic made its first appearance on the Pacific Coast in 1914, at Santa Monica, Cal., where de Palma again won, driving his Mercedes across the finishing line after a run of 294 miles at the record-breaking average of 75.6 miles an hour.

Resta's remarkable showing at the Panama-Pacific Exposition races has placed him in the limelight of the motor racing world. Many enthusiasts are confidently predicting that he will win the Indianapolis speedway event.

ONE-MILE CIRCULAR DIRT TRACK RECORDS.

Miles	Time	Driver	Car	Place	Date
1	44.00	Oldfield		St. Louis, Mo.	Sept. 20, 1914
2	1:27.00	Oldfield		St. Louis, Mo.	Sept. 20, 1914
3	2:27.31	Disbrow	Simplex	Cleveland, O.	Sept. 14, 1912
4	3:17.02	Disbrow	Simplex	Cleveland, O.	Sept. 14, 1912
5	3:40.40	Oldfield		St. Louis, Mo.	Sept. 20, 1914
10	8:17.03	Disbrow	Simplex	Cleveland, O.	Sept. 14, 1912
12	9:20.80	Disbrow	Simplex	St. Louis City, Ia.	July 7, 1913
15	13:03.00	Disbrow	Simplex	Hamline, Minn.	Sept. 12, 1914
20	17:10.60	Burman		Springfield, Ill.	Sept. 19, 1914
25	21:38.00	Burman		Springfield, Ill.	Sept. 19, 1914
50	47:32.00	De Palma	Simplex	Syracuse, N. Y.	Sept. 16, 1914
50	45:32.00	Disbrow	Simplex	Detroit, Mich.	Sept. 29, 1912
75	1:15:52.50	Wishart	Mercer	Columbus, O.	Aug. 25, 1912
100	1:31:30.00	Alley		Minneapolis, Minn.	Oct. 24, 1914
150	2:30:51.00	Wishart	Mercer	Columbus, O.	Aug. 25, 1912
200	3:21:48.00	Mulford		Columbus, O.	July 4, 1913

HALF-MILE DIRT TRACK.

Miles	Time	Driver	Car	Place	Date
1	1:03.80	Endicott		Toledo, O.	Sept. 13, 1913
2	2:13.60	Disbrow		Oklahoma City	Oct. 3, 1914

24-HOUR TRACK RACES.

Stock Chassis	Lozier	Patschke and Mulford	1196 Miles	Brighton Beach	Oct. 15, 1909
Class C	Stearns	Poole and Patschke	1253 Miles	Brighton Beach	Oct. 18, 1910
Class C Speedway	Flat	Verbeck and Hirsh	1491 Miles	Los Angeles, Cal.	April 8, 1911

WORLD'S RECORDS—FOREIGN.

Miles	Time	Driver	Car	Place	Date
1/4	14.76	Hemery	Benz	Brooklands, Eng.	Nov. 1913
1	31.55	Hemery	Benz	Brooklands, Eng.	Nov. 1913
*1	17.16	Hemery	Benz	Brooklands, Eng.	Nov. 1913
50	28:18.65	Goux	Peugeot	Brooklands, Eng.	April 12, 1913
100	56:29.93	Goux	Peugeot	Brooklands, Eng.	April 12, 1913
150	1:28:35.67	Bollot	Peugeot	Brooklands, Eng.	April 12, 1913

Hours	Distance	Car	Place	Date
1	106 Miles 387 Yds.	30 H. P. Peugeot	Brooklands, Eng.	April 12, 1913
2	195 Miles 1897 Yds.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
3	287 Miles 856 Yds.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
4	330 Miles 628 Yds.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
5	473 Miles 464 Yds.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
6	566 Miles 589 Yds.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
7	653 Miles 147 Yds.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
8	748 Miles 247 Yds.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
9	840 Miles 1533 Yds.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
10	910 Miles 969 Yds.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
11	999 Miles 828 Yds.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
12	1078 Miles 460 Yds.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913

Miles	Time	Car	Place	Date
200 Miles	2 Hrs. 5 Min. 6.28 Sec.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
300 Miles	3 Hrs. 7 Min. 45.46 Sec.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
400 Miles	4 Hrs. 12 Min. 15.08 Sec.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
500 Miles	5 Hrs. 16 Min. 40.01 Sec.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
600 Miles	6 Hrs. 22 Min. 54.16 Sec.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
700 Miles	7 Hrs. 29 Min. 36.55 Sec.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
800 Miles	8 Hrs. 34 Min. 25.15 Sec.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
*900 Miles	9 Hrs. 53 Min. 22.29 Sec.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913
1000 Miles	11 Hrs. 6 Min. 38.27 Sec.	30 H. P. Sunbeam	Brooklands, Eng.	Oct. 1, 1913

*Kilo.

All above records driven in two-hour spells by K. Lee Guinness, D. Resta and M. Chassagne.

THREE TIFFIN TRUCK MODELS.

THE Tiffin Wagon Company, Tiffin, O., is building three sizes of motor trucks of 1500, 2000 and 4000 pounds capacities which are designed to meet the increasing demand for high-class vehicles that have extreme endurance and economical operating cost. No new features have entered into their construction, every component having met the test of time and usage under the severest conditions of actual service. The types are designated as A, G and M, respectively, all being practically alike in constructional details except in the motors.

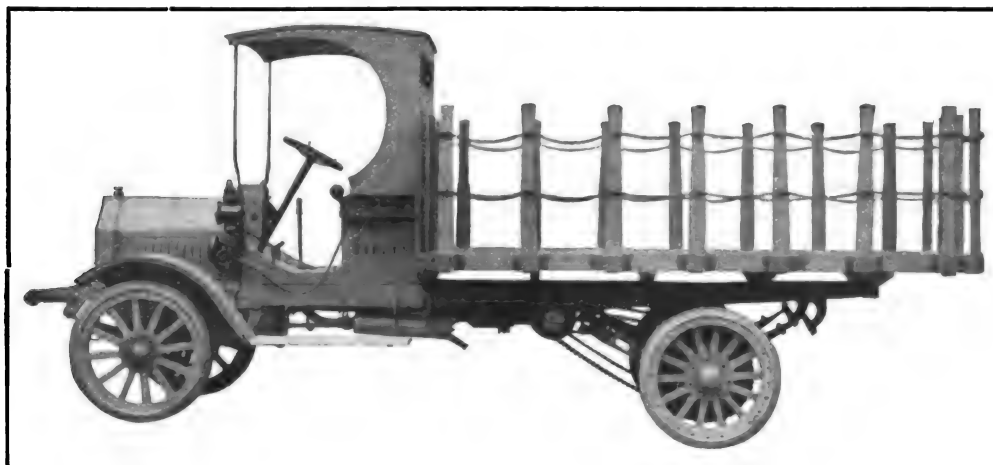
Model A has a Buda motor, a four-cylinder water cooled, vertical L head type, with cylinders cast en bloc; having a bore of $3\frac{3}{4}$ inches and stroke of $4\frac{1}{2}$ inches, which is rated by S. A.

by centrifugal pumps. Radiation is promoted by fans at the front of the engine case in all cars. Lubrication is by a combination force feed and splash system, the oil being supplied to the main bearings and the timing gears by plunger pumps driven from the camshafts. The excess of oil lubricates the cylinders, pistons, camshaft and tappets by the splash system, the overflow draining back into the reservoir. The drivers may learn by a glance through sight glasses on the outside of the engine cases the volume of oil in the reservoirs. An automatic float feed carburetor is used. The following specifications will generally apply:

Ignition is by the Bosch high-tension magneto. The clutch is a leather-faced Hartford design fitted with

expanding springs, which is supported from a cross frame member, the driving shaft being coupled with the clutch shaft and the main shaft of the gearset by a universal joint at either end.

The gearset is a selective sliding type, having three forward speed ratios and



Model M, Showing Double Chain Drive and Position of Driver's Cab.

E. formula at 22.5 horsepower, but is stated by the manufacturer to develop 30 horsepower at 1500 revolutions a minute.

Models G and M have Continental motors, that in the former model being a four-cylinder, water cooled, L head type, with the cylinders cast en bloc; having a bore of $3\frac{3}{4}$ inches and stroke of $5\frac{1}{4}$ inches, and rated by S. A. E. formula at 22.5 horsepower. The motor in model M has $4\frac{1}{8}$ -inch bore and $5\frac{1}{4}$ -inch stroke, and a rating of 27.25 by S. A. E. formula. The builder rates the model G engine at 30 horsepower, and claims 42 horsepower for model M. The motors are under hoods ahead of the driver's seat.

The cooling system for the model A motor is by a thermo-syphon circulation through the motor and a vertical tube radiator; that for the motors for models G and M is by forced circulation

reverse, and is assembled with the jackshaft, the unit being supported by a frame cross member and heavy steel hangers.

The drive is through radius rods rotating on collars on the rear axles, and pivoted to the jackshaft. The power is transmitted by sprockets and chains from the jackshaft to the rear wheels. Springs are of the semi-elliptic type, which support heavy frames having strong cross members and heavy gusset plates. The front and rear axles of models A and G are Sheldon productions, the front axles being I section drop forged steel, and the rear of rectangular steel drop forgings. Model M has Timken axle equipment. Model A's axles are equipped with ball bearings, while the other two models are fitted with annular ball or roller bearings. The wheelbase of the different models is as follows: A, 112 inches;

G, 128 inches, and M, 140 inches; while the treads of A and G are 56 inches, with 60 inches for the M. Single solid tires are used throughout.

The steering column is at the left side, it carrying ignition and throttle levers of the friction type. The steering gear is an irreversible screw and nut design, the control being by the usual foot pedals for the clutch and service brake, with hand levers for the gear shift and emergency brake at the centre of the dashboard. The service brake is external contracting on drums on the jackshaft. The internal expanding emergency brake operates within drums on the rear axles. Raybestos is used to face all brake bands or shoes.

While the company builds a standard body, it is prepared to construct special designs, having had wide experience in supplying special municipal equipments, such as automatic flushing machines, dumping wagons, steel bucket street cleaning and garbage carts, specializing on street flushing apparatus of the constant pressure type. Detailed information will be supplied by the company.

The drums in which the service brakes operate are 10 inches in diameter and two inches face on all models. The emergency brakes act within drums whose dimensions vary in the three models. The drums on the Model A chassis are 12 inches diameter and 2½ inches face; model G, 14 inches diameter and three inches face; model M, 16 inches diameter and 3½ inches face. The chassis is equipped with the usual tool box and tool kit, jack, horn, oil dash and tail lamps and bumper.

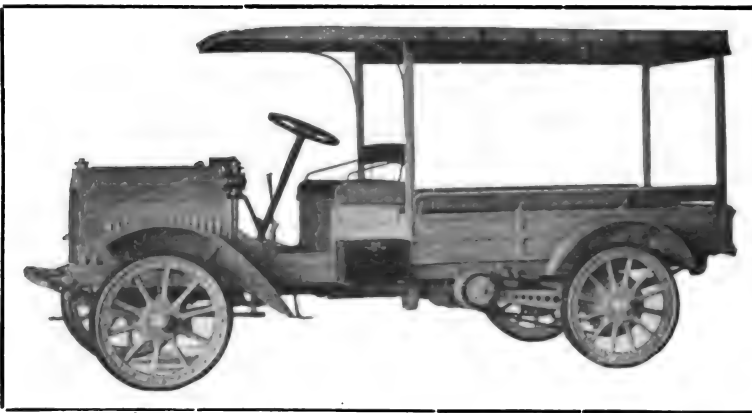
DETROIT MOTOR TRUCK CONVENTION.

Following a policy established for previous motor truck conventions, the national convention to be held in the banquet hall of the new Statler hotel, Detroit, Mich., May 5 and 6, is open both to members and non-members of the National Automobile Chamber of Commerce. Definite details of the programme have not yet been decided upon, but announcement has been made that among the papers will be several dealing with service to be afforded to users by makers and dealers, standardization of capacity rating, shows and demonstrations, and other subjects of great interest to motor truck manufacturers. The first two motor truck conventions ever held in the

United States, in 1912, and under the auspices of the National Association of Automobile Manufacturers, predecessor of the National Automobile Chamber of Commerce, resulted in the adoption of a standard warranty, standard speed ratings, body weight allowance, caution plate, frame widths and lengths and standard demonstration charges.

GOODYEAR CORD TIRES FOR GAS CARS.

The first Goodyear Cord tires were made in 1904 by the Goodyear Tire & Rubber Company, Akron, O., for electric vehicle use, and for ten years the sales activity were confined to that field. Lately, however, owing to the increasing demand by owners of gasoline cars, the company's experts have been turning their attention to producing tires for gas motor automobiles.



Model A. Showing Accessibility and Standard Canopy Top Body.

"Part of the phenomenal success of the Goodyear Cord tires," states a company representative, "comes from the fact that they are the only straight-side Cord tires marketed—the only No-Rim-Cuts in cord type. During the past two years the Goodyear company has added a comfortable stack of contracts with gasoline car manufacturers to the electric car contracts already existing for cord tires."

Frank Marx has been elected president of the Detroit-Wyandotte Motor Company, Detroit, Mich., maker of Horner trucks. Business for 1914 was reported extremely satisfactory and production will be increased this year.

The Lumen Bearing Company, Buffalo, N. Y., has added "Autobronze" and "Machine-bronze" to its list of products. As indicated by the names, they are special bronzes, mixed for use on the automobile and on machinery.



THE JITNEY SITUATION.

The jitney 'bus as a means of transportation is now in its formative period. Whether it is to become a permanent institution, time alone can tell. The situation today is well shown elsewhere in these pages, and is well worth careful perusal* by the reader. The statements are the result of careful investigation and show the remarkable growth, the cost of operation, the returns to the jitney operator or owner, the facilities they offer to the public, and the enthusiasm with which the travelling public is now patronizing the jitney 'buses. In the forthcoming issue of *The Automobile Journal* the jitney 'bus will be treated in an article which will show what the service must become to make itself worthy of permanency.

DEMAND FOR UNIFORM LAWS.

The annual crop of motor vehicle legislation is now pending before the law makers of a considerable number of states, and the bills may be classified as good, bad and worse than bad, many of them being conceived with no other purpose than to increase the revenue from a class that has for years been easily picked, and which has

usually deserved all the plucking because of the extreme indifference to what are known to be prejudicial, if not pernicious, laws. The real necessity is a uniform motor vehicle law, and the motoring population is sufficiently large to be given substantial consideration by legislators.

THE COMING RACING SEASON.

There is good reason to believe there will be an unusually large number of motor car racing events this year. The transfer of the Vanderbilt and Grand Prize cup races to the Pacific Coast has largely developed interest in that section, and the success of these has stimulated activity in competition in the East. The fact that a foreign racing driver won both the main races was not only surprising, but that the same man with the same machine should successively defeat two fields of America's best motorists has completely overturned the theories of those who assume to know.

Unfortunately for predictions regarding the outcome at Indianapolis, the two-time winner at the Panama-Exposition did not compete in the Venice, Calif., race. Had he taken part, the prognosticators would now have better grounds on which to estimate the results in the coming 500-mile classic. As it was, however, Oldfield showed himself a formidable contestant.

THE NEW GASOLINE PROCESS.

The motoring world owes an incalculable debt to Dr. Walter M. Rittman, discoverer of a process of manufacturing gasoline that will produce three gallons from the same volume of basic material that now produces one gallon. The details of the process were described in the preceding issue of *The Automobile Journal*, while this issue contains the announcement of plans by the federal government to form a company to undertake manufacture under the Rittman patents, which were dedicated by the discoverer to the American people. One of the effects of the discovery is that it will conserve the supply of gasoline. The process is also perfected for the production of chemicals for the making of high explosives, and, more important from an economical standpoint, for the making in large quantities of dyestuffs, which the United States is now dependent upon European countries for its supply.

TWO ALLEN CHASSIS AND FIVE BODY TYPES.

TWO chassis sizes are built by the Allen Motor Company, Fostoria, O., which are equipped with five different body types. The smaller chassis, with roadster body, is known as model 33; with a five-passenger touring body it is model 34; with a five-passenger body and somewhat changed equipment it is model 35. The larger chassis, with roadster body, is model 38, and with a seven-passenger touring body it is model 40. These machines are built within the range of what may be termed the popular priced classes. They are well designed, wholesome, slightly cars, unusually completely equipped, and have every accessory that makes for the convenience of the passengers. In body design and finish they are especially attractive.

The manufacturer of these chassis points out that a large part of the metal parts are special materials, which have been selected to insure more than ordinary endurance, and practically all of the steels are heat treated. The system of inspection is rigid, so that no defect that can be detected by care and supervision will be passed. The power plants have been developed by L. A. Sommers, of the Sommers Motor Company, and to secure exclusive control of these engines the Sommers company was taken over by the Allen company. Very broad claims are made for the endurance, the efficiency and the operating and upkeep economy of these motors.

The factory equipment of the Allen company includes highly perfected machine tools, fixtures, etc., so that operations may be with the largest degree of economy, and the work as produced shall be thoroughly standardized. Much care is observed to have the quality of the metals uniform, analysis and precise test being employed, and not only are the reciprocating parts of the motors given running tests to determine balance, but the crankshaft, flywheel and clutch as well.

For the purpose of description the smaller chassis will be dealt with first, this having wheel-base length of 110 inches and tread of 56. This is equipped with a unit power plant in which is

the motor, clutch and transmission gearset, the assembly being clean and wholesome, practically all the moving parts being enclosed and protected from road accumulations and effects of abrasives.

The motor is a four-cylinder, water-cooled, four-cycle, L-head type, with the cylinders cast en bloc, having cylinder bore of $3\frac{5}{8}$ inches and stroke of five inches, the horsepower rating by the S. A. E. formula being $20\frac{1}{4}$. The piston displacement is 207 inches. The manufacturer claims that the motor has developed 37 horsepower by dynamometer test. The reader will note that this is nearly double the empirical rating of the formula. The cylinders are cast with the

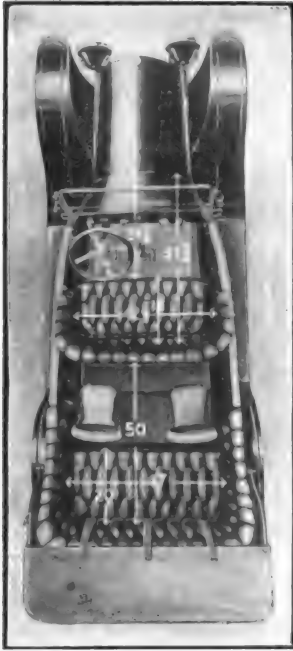


The Latest Allen Model 34, Which is Completely Equipped with Westinghouse Electric Lighting and Starting.

water jackets and the intake manifold integral, large water channel and outlet. This plate is metal insuring extreme endurance. The water passages are large and the arrangement is such that there is abundant circulation about the cylinders and the gas manifold is well heated. The gas manifold is free from abrupt curves and is tapered to insure free passage of the gases. Theackets are designed to effectually cool the exhaust ports. The block is cast with the head of the water jacket open, and this permits thorough cleaning of the water passages and insures free circulation. The cover plate is formed with a large water channel and outlet. This plate is retained by cap screws.

The cylinders are carefully bored, reamed and finished. The pistons are a fine grade of metal,

and are machined to secure thin walls of uniform thickness. The pistons are long and are channelled for three expansion rings above the center,



Top View of Allen Model 40.

ter, with oil grooves, to insure complete lubrication of the cylinder walls and the pistons. The crankcase is an aluminum casting of the barrel type, with extensions for the housing of the timing gears and the bell for the flywheel housing and the rear supporting arms cast integral. The oil reservoir is bolted to the bottom of the casting, the upper portion of this forming the oil troughs for the splash lubrication.

The crankshaft is a two-bearing type, $1\frac{7}{8}$ inches diameter, the front main bearing being $3\frac{1}{2}$ inches and the rear main bearing $4\frac{1}{2}$ inches length, the shaft having a total of eight inches of bearing length. The crank pin bearings are two inches length. The crankshaft is a special steel, carefully treated to secure great endurance, with heavy webs, having a tensile strength of 110,000 pounds to the square inch. The main and connecting rod bearings are of special S. A. E. formula babbitt. The connecting rods are I section drop forged steel. The piston pins are hollow tube, hardened and ground, clamped in the small ends of the connecting rods, which oscillate in the piston bosses. The camshaft is $1\frac{1}{8}$ inches diameter, a three-bearing type.

The valve action is conventional, the square tappet rods being mounted in babbitt-lined cast iron sleeves. The tappets have the usual adjusting screws and nuts. The valves have cast iron heads electrically welded to nickel steel stems, and they operate in long bushings. The set of four timing gears have faces one inch width with helical cut teeth, one of which drives the camshaft, and the other the outside shaft by which the Westinghouse generator is driven. The motor is lubricated by a constant level splash system, the oil being forced through tube from a reservoir by a pump on the outside of the crankcase to the front main bearing, which is

flooded. The excess oil floods the timing gears and the drainage fills the oil pits in the base of the crank chamber, and thence is distributed by splash to the camshaft bearings, cams, tappet rods, main connecting rod and wristpin bearings, and the cylinders and piston walls. The overflow is drained to the reservoir. The motor is cooled by a thermo-syphon circulation of water through the engine and a tubular radiator, the system having $4\frac{1}{2}$ gallons capacity. Radiation is promoted by a fan carried on a standard ahead of the cylinder block with an adjustable bearing, that is driven by a pulley on the generator shaft. The ignition is by a combination Westinghouse system which has a generator driven at engine speed, with an 80 ampere hour LBA battery, and a separate motor that is mounted at the right side with a pinion that meshes with teeth cut in the rim of the flywheel. The system has the Bendix automatic gear control. The carburetor is an automatic float feed type with hot air auxiliary connection and an air control for starting in low temperatures.

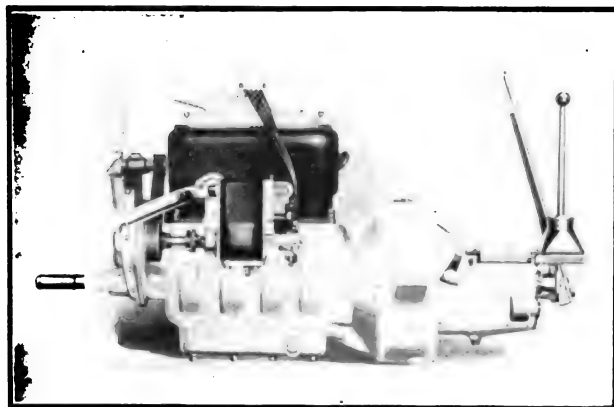
The clutch is a leather-faced pressed steel cone $13\frac{3}{4}$ inches diameter and $2\frac{3}{8}$ inches width, fitted with springs to insure easy engagement. A fiber clutch brake facilitates positive meshing of the gears when changing speed ratios. The transmission gearset is a selective sliding gear



The Allen Model 35, Showing Crown Fenders and Rounded Radiator.

type that has three forward speed ratios and reverse, with wide-faced chrome nickel steel gears and chrome vanadium steel shafts, mounted on

double-row, self-aligning annular ball bearings. The gearset case is bolted to the bell housing. The power plant is mounted on three points.



The Unit Power Plant of the 1915 Allen 33 and 34. Note: Mounting of Westinghouse Generator.

The forward end of the driving shaft is fitted with a universal joint that is enclosed in a ball and socket housing that is packed with grease. The shaft is enclosed in a heavy torsion tube. The rear axle is a semi-floating construction with large diameter taper driving shafts of nickel steel mounted on Hyatt roller bearings. The master gear and the driving pinion are nickel steel and the differential assembly is carried on Hyatt roller bearings. The forward axle is an I section steel drop forging, with large spindles fitted with ball bearings.

The frame is a pressed steel channel section with four cross members, well braced and reinforced. This is suspended on semi-elliptic springs forward and three-quarter elliptic springs at the rear. The front springs are 34 inches length and the rear springs 46 inches length. Both are fitted with bushed eyes and ground and hardened bolts with oil grooves and grease cups. The wheels are 32 inches diameter, wood, artillery type, with demountable rims and are equipped with 32 by 3½ inch tires. The steering gear is an irreversible worm and full gear construction, with the worm mounted on ball thrust bearings with eccentric adjustment, reached from the exterior, with adjustable ball and socket spring joint at either end of the reach rod.

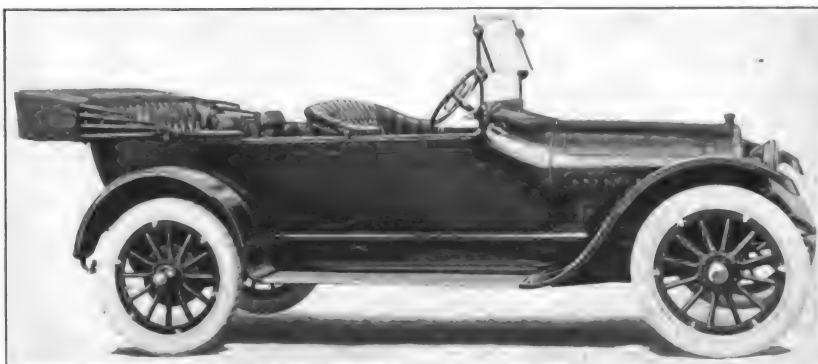
The brakes operate on and with 12½ inch steel drums on the rear wheels, the service brake

having external contracting bands, and the emergency brake internal expanding shoes. Oil shedders keep the brakes free of lubricant and springs prevent the brake bands dragging. The brakes are easily adjustable.

The steering wheel is at the left side, on which are mounted the friction retained throttle and ignition levers. The clutch, service brake and accelerator are operated by foot pedals, and the emergency brake and the gear shifting by hand levers in the center of the footboard. The fuel tank has 11 gallons capacity and is under the driver's seat. On the instrument board are the speedometer, lighting, starting and ignition switches, voltmeter and carburetor air control. The lights are fitted with a dimming attachment. Full equipment is included with the bodies.

The chassis, when equipped with the model 35 body, has the Auto-Lite two-unit system of lighting, starting and ignition, this including a generator driven at engine speed with Connecticut automatic control. The starting motor is geared to the flywheel. The Bendix automatic gear control is utilized. The fuel is supplied by a vacuum system. The wheels are equipped with 33 by four inch tires, and the instrument board has a sight feed for the motor lubrication system and a light.

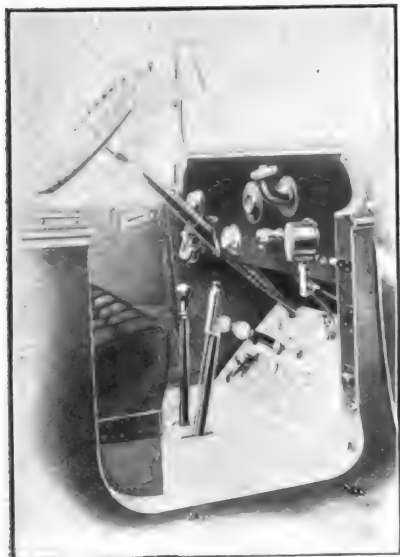
The model 38 and 40 chassis has wheelbase of 118 inches and standard tread. It is equipped with a unit power plant with a motor of practically the same type, and construction, with bore of 4½ inches and stroke of five inches, this having a S.A.E. rating of 27.25 horsepower. The piston displacement is 268 cubic inches and the claim is made that the engine will develop 40 horsepower in normal service. The cylinder and piston construction are to the same general speci-



The Allen Model 40 Seven-Passenger Touring Car, Which Has the Auto-Lite Starting and Lighting System.

fications, but the crankcase is divided, the upper section carrying the main bearings and the lower the engine base and the oil reservoirs. The

lower section can be removed for work on the connecting rod and main bearings. The motor has two secondary shafts, the one to operate



Instrument Board of Allen Models 38 and 40.

the cams and the other to drive the Splittdorf dual magneto and the Auto-Lite generator, both at engine speed. The battery is an LBA six-volt 100 ampere hour type. The starting motor is at the same side (the right) and this has a sliding pinion on its shaft that meshes

with the teeth cut in the rim of the flywheel.

At the left side of the motor is the carburetor and the oil pump. The systems of lubrication and cooling are the same, but the water circulates through a cellular radiator. The water capacity is $6\frac{1}{2}$ gallons. The carburetor is an automatic float feed type with auxiliary air control on the steering column, and with a hot air jacket connection with the exhaust manifold. The clutch is a multiple disc type, with steel plates faced with Raybestos, insuring positive and easy engagement. This clutch may be run in an oil bath or dry, as desired. The transmission gearset is a sliding gear selective construction of similar design to that of the smaller chassis, but the gears may be locked in and out of mesh. The power plant is mounted on three points. The driving shaft is fitted with two universal joints between the gearset and the driving shaft pinion, these being enclosed in grease packed casings. The rear axle is a full floating type having large diameter shafts of heat treated nickel steel and it is built with large annular ball bearings throughout. A rear inspection plate affords access to the differential assembly. The

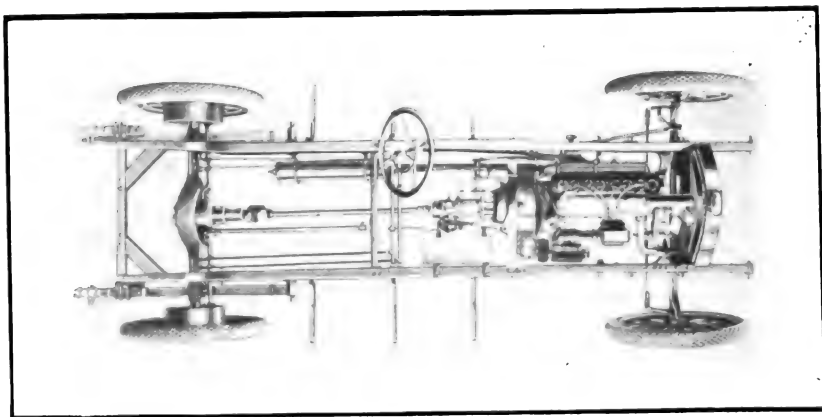
front axle is a drop forged I section, equipped with ball bearings.

The frame is built of pressed steel channel section, cambered at the rear, with four cross members, strongly braced and reinforced. This is carried on semi-elliptic springs, 36 inches length and two inches width, and three quarters elliptic springs, 50 inches length and $2\frac{1}{4}$ inches width, at the rear, these being underslung. The wheels are equipped with 35 by $4\frac{1}{2}$ inch demountable tires. The steering gear is the same as in the smaller chassis. The brakes are both internal expanding within steel drums 14 inches diameter and four inches face on the rear wheels. These are adjustable from the exterior.

The control is by a steering wheel at the left side, with clutch, service brake, accelerator and starting pedals, with friction ignition and throttle levers on the steering wheel, and with the emergency brake and the gear shifting levers at the right in the centre of the footboard. On the instrument board are the speedometer, ignition, lighting and starting switches, voltmeter, air control and gasoline gauge.

The equipment of both the models 38 and 40 is unusually complete. The bodies are very large and spacious and are exceptionally well finished. Allen cars are guaranteed against defects in material and workmanship for a year from the date of purchase.

Much thought has been given to accessibility, and the chassis designs have been very carefully developed, being simplified and refined, with ample factors of safety for components and with provision for thorough lubrication. The claim is made by the company that all machines built



Plan View of the Allen Chassis, Models 38 and 40, Showing Extra Long Underslung Rear Springs.

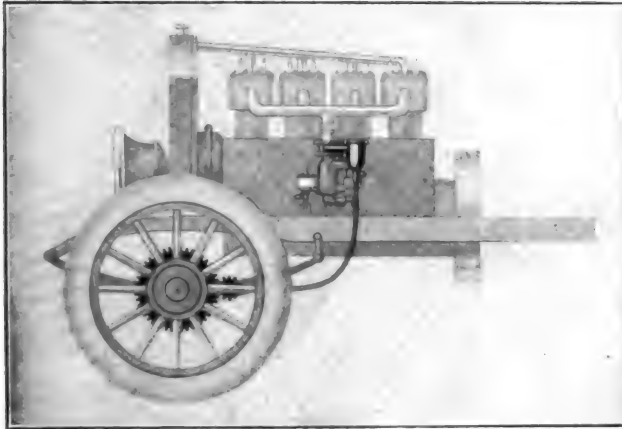
are tested by road work until they are equal to the standard required for Allen cars, which insures that the vehicles are in every way efficient.

PIERCE SPEED CONTROLLERS.

THE Pierce Speed Controller Company, Anderson, Ind., is the manufacturer of ingenious devices that, having been regulated to a

in turn acts upon the intake manifold.

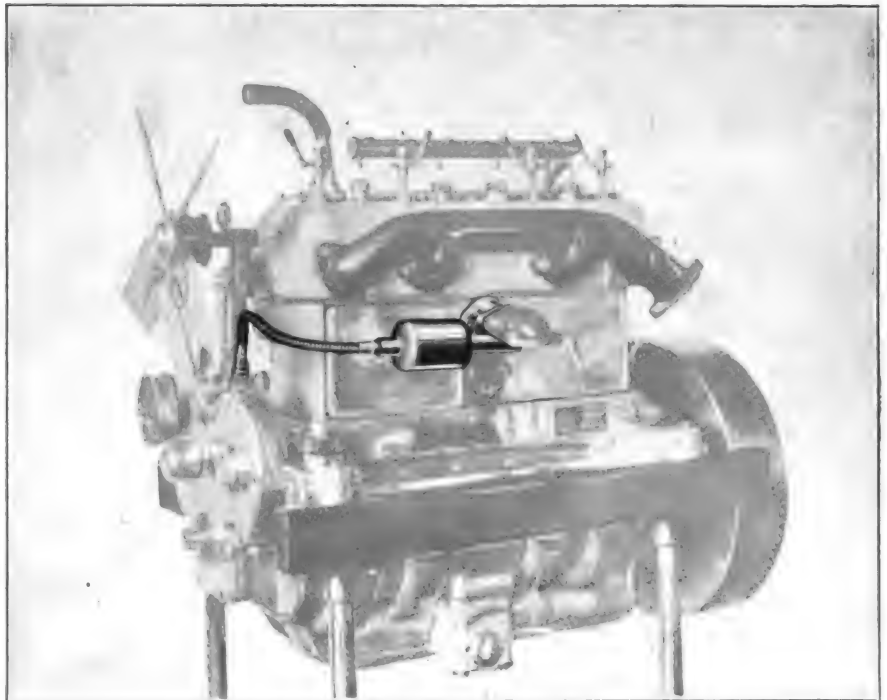
The most recent production of the Pierce Company, known as model G, is bolted between the carburetor and the intake, where it is firmly secured and cannot be removed. It is driven by a gear that meshes with a pinion on the main shaft of the power transmission system. In actual operation the procedure is as follows: As the movement of the vehicle reaches the speed for which the controller is adjusted, two weights on the controller shaft swing outward as the velocity of the shaft is increased, forcing forward a sleeve that acts upon a slidable shaft, which in turn operates the butterfly valve. The valve, which normally does not interfere with the flow of gas, is so swung as to reduce the volume of fuel that the engine draws. As the speed is reduced, a spring, calibrated to a standard of pressure, pushes against the sleeve and weights and serves to swing the butterfly valve back into normal position so as to permit a greater fuel supply. The action is positive, simple and practical. The controller can be finely adjusted, and is not subject to great wear. It is encased in a dust and water proof housing, and when once lubricated will not require further attention for a



Front Wheel Driven Pierce Speed Controller That Regulates Maximum Speed of Vehicles.

speed rate, automatically prevent the drivers of trucks, fire apparatus, ambulances and like vehicles from exceeding that speed. From the viewpoint of saving in fuel, lubricants, excessive wear through increased stresses due to over-speed, the provisions for traffic safety and the minimum of effort in grade climbing, they have proven eminently satisfactory in the hundreds of tests to which they have been subjected in actual service in many conditions of motor transportation.

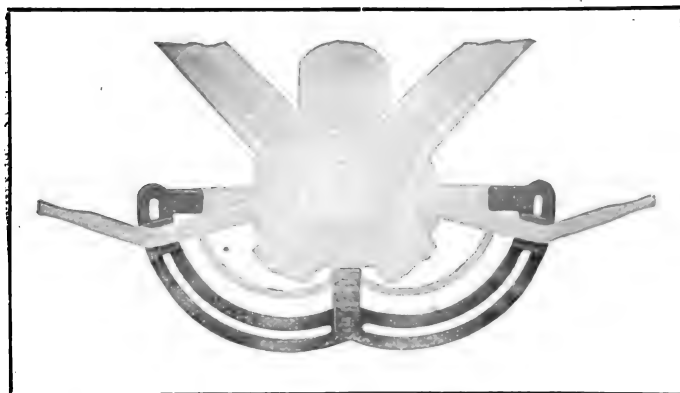
Two different types are produced. One is known as the Pierce governor, which controls the speed by regulating the supply of fuel. The other is the Pierce speed controller, which positively regulates the number of revolutions of an engine, and limits the movement of the vehicle. The principle of operation in both types is an adaptation of the ball governor of the steam engine, in which centrifugal force controls a valve that



Installation of Pierce Centrifugal Motor Governor on the Engine, Showing Drive from the Camshaft.

long period. The controller can be adjusted to any speed desired, and is sealed so that it cannot be altered without such tampering being evident at a glance.

The Pierce centrifugal motor governor, which weighs but nine ounces and is strongly constructed and long enduring, is used by many motor manufacturers using governors, and is highly indorsed. In principle, its essentials are practically the same as the model G, except that it is independent of the speed of the wheels, acting upon the engine when the predetermined number of revolutions a minute is reached. It is driven usually from the camshaft, which is designed to be driven at half motor speed. It not only limits the speed of the vehicle, but prevents racing the engine. An accompanying illustration shows the controller installed to be operated from an engine camshaft.



Pierce Auxiliary Quadrant With Friction Levers for Ford Cars, Which Afford Fine Regulation of Ignition and Fuel Supply.

The Pierce speed controller is shown in another illustration, it being attached to a front wheel, from which it is driven. A feature of this instrument is that it will not operate until the vehicle is moving at a speed within a mile an hour of the rate for which it has been set. It can be installed in about three hours, and is particularly adaptable for vehicles that are already in service.

A hole in the controller cover shows a dial that can be graduated to miles an hour. By revolving a knurled dial the rate of speed can be set from zero up to a maximum of 25 miles an hour. An admirable feature is that after the speed rate is set, the device can be locked by a key, the keyhole covered, and the cover sealed. The driving connection with the front wheel can also be sealed, which prohibits tampering by unauthorized persons. Another feature is that the device can be locked so that a vehicle cannot be started without the use of a key.

Another product of the Pierce Company is its quadrant with two friction retained levers for replacing the notched quadrant and levers for controlling the ignition system and fuel supply of Ford cars, which is shown in the accompanying illustration. It is designed for unlimited adjustment and precise regulation, and cannot be effected by wear. The device, which is interchangeable and is sold at a very moderate price, can be attached by any car owner, which is done by tightening a simple set screw. A bell signal for trucks and pleasure cars that is extremely serviceable and easily attached is another product of the Pierce Speed Controller Company.

TRUCKS WILL RELIEVE CONGESTION.

In a detailed report on street traffic in Boston, Mass., a committee of the Boston chamber of commerce says that the development of the motor truck will tend to relieve congestion by moving all kinds of merchandise in larger units and more rapidly. The report says: "The ease with which motor vehicles can be handled and the fact that they occupy less space than horse drawn vehicles are also distinct advantages. A careful study of the use of horse drawn and motor vehicles, made at the railway terminals, plainly showed the superiority of the former. The average speed of the motor vehicles was found to be from two to three times as great as that of horse drawn vehicles. Yet the motor truck is in its infancy, and it is impossible to forecast the extent of this development. The number of trucks in Boston in 1912 between Jan. 1 and May 15, was 2500. During the same period of 1913 the number of such cars licensed was 4400".

BIG BUSINESS FOR MAXWELL MOTOR.

Prediction is made that in the current fiscal year, ending July 31, the Maxwell Motor Company, Inc., Detroit, Mich., will earn about \$3,000,000. This estimate is based upon the earnings on actual sales for the seven months ending March 1, which were \$1,500,000, February alone showing more than \$300,000. The best five business months remain, and the expected sales will if past demands continue, realize the revenue stated.

E. G. Shick, formerly located in Cleveland, O., has been appointed manager of the Goodyear Tire and Rubber Company factory branch at Cincinnati, O., succeeding L. I. First.

ECLIPSE PORTABLE UNLOADER.

THE Galion Iron Works and Manufacturing Company, Galion, O., constructs a portable unloader known as the Eclipse, which is designed

known as the gondola, or with older types which are fitted with bottom slides so that the load can be dumped by gravity. It can be operated by one man, although one or two more may be necessary to trim the railroad car load.

The unloader's frame, bin and tower are constructed of heavy timber and planking, reinforced with iron, steel and wood braces. Gravity is obtained by the floor of the bin being inclined four feet in the seven feet of its full width, which insures rapid discharge through three chutes into the waiting truck, as is shown at Fig. 2.

The elevator is set up 13 feet from the railroad track. At a distance of five feet seven inches from its base is dug a pit whose dimensions are seven feet depth, six feet width, five feet six inches length, with the furthest side 18 inches from the rail. In the pit is placed a box that conforms to the size of the pit. In the rail side of the pit is excavated an inclined channel, into which is fitted a steel that extends under the track to the further rail, and which is directly under the hopper of the gondola that is being unloaded. From the base of the pit to the top of the bin extends a railway of heavy timber, as shown in Fig. 1, on which is hoisted a steel bucket having a capacity of about one ton.

A wire cable is attached to the cap timber of



Fig. 1—Side View of the Eclipse Unloader, Showing Constructional Features with the Bucket About to Be Dumped.

to greatly economize the unloading of coal, sand, slag, crushed stone, etc., either at piers or in railroad yards. It is fitted for a wide range of service, and is said to be giving entire satisfaction in minimizing unloading costs.

The unloader is constructed in 15 and 50-ton capacities, both sizes being alike in constructional details. Though having all the qualities of permanent construction when set up for operation, the unloader can be partially dismantled in a few hours and transported by animal, or tractor power, it being mounted on two trucks or axles on which are four wheels with steel spokes and wide rims. It is designed to be worked in conjunction with the hopper hallowed type of railroad car



Fig. 3—Loading an Industrial Train at the Plant of the McNerney Construction Company, Canton, Penn., by an Eclipse Portable Unloader.

the tower, and thence is carried through a sheave on the bail of the bucket, through a pulley at the top of bin tower, thence to a third pulley at the front end of the bin, from which it passes through a pipe sheathing in the bin itself and down to the hoisting drum, which is operated by a six horsepower water-cooled gasoline engine that is located beneath the bin. The hoist is fitted with a clutch and lever.

At the beginning of work, the steel bucket rests at the pit bottom, the steel chute extending to it from the hopper of the car. The hopper is opened and the coal, etc., drops by gravity into the inclined chute and thence into the bucket. A gate on the chute controls and stops the flow. The operator of the unloader may then set the hoisting mechanism in operation by a backward

the unloader will handle any material that can be discharged through the regular hopper-bottom railroad cars. Special equipment is constructed to handle bituminous coal.

REPUBLIC'S 100 PER CENT. DIVIDEND.

The Republic Motor Truck Company, Alma, Mich., declared a dividend of 100 per cent., which was paid Feb. 9. The company has had a remarkably profitable business in the 18 months of its existence.

CONSOLIDATED CAR IN NEW HANDS.

C. L. Lewis, Toledo, O., has been elected president of the Consolidated Car Company, which was organized last December to take over the business of the Abbott-Detroit, Detroit, Mich. Mr. Lewis, who is secretary and sales manager of the Edward Ford Plate Glass Company, Toledo, and manufacturer of automobile parts and accessories, recently secured control, with associates, of the company. Plans have been completed, it is said, for financing the business on a more extensive basis than was contemplated at the outset.

M. J. Hammers, D. E. Perry and F. E. Sanbush remain with the company in managerial capacities as heretofore, while A. C. Knapp and R. A. Palmer are no longer connected with it. Statement is made that practically all of the old Abbott-Detroit dealers and distributors have re-contracted with the company, and prospects for an excellent business are said to be assured.

The owners and dealers in Abbott-Detroit cars will receive this information with pleasure, inasmuch as it assures the possibility of obtaining parts.

INTERNATIONAL HARVESTER BONDS.

The International Harvester Company, Chicago, Ill., has sold \$20,000,000 five per cent. gold bonds to a syndicate of bankers, and these are now being offered to the public at par. These bonds are issued for the purpose of retiring \$15,000,000 in notes of the old company, and for providing \$5,000,000 in cash to pay current bills, now overdue.



Fig. 2—Front View of Unloader, Showing Crushed Stone Being Transferred to the Truck from Railroad Cars.

and forward movement of a long wooden lever that is connected with the upright lever of the hoisting apparatus, which engages and releases a clutch. When the bucket reaches the top of the bin, a trigger trips the bucket and the content is deposited into the bin, from which it descends by gravity into the trucks, the chutes being provided with gates operated by cables and counterweights to regulate the flow. These chutes are operated by the drivers of the trucks.

The elevator will handle from 250 to 500 tons of material a day, according to conditions, with one man operating it, the truck loads being trimmed automatically. The company claims that the transfer from railroad car to vehicle will cost less than two cents a cubic yard, and that

PRACTICAL MOTOR CAR REPAIRS.

FLYWHEELS are usually keyed to a shaft end, often with a gib, which is driven in until the wheel is firmly locked. This form of retention is also used for gears. When a gib is used a tool of the type that is shown at Fig 6-A can be used advantageously. This tool is of steel, with curved or hooked ends, and the point of the end is placed under the lip of the gib and the back set against the hub of the flywheel or gear. The hand leverage alone will not be sufficient to start the gib, but a series of sharp blows with a hammer will usually loosen it. The size tool will depend upon the proportions of the work that it is used upon, but several of different lengths will be found very useful in a shop.

The shut off cock in the fuel supply line is not always located so that it can be conveniently reached. Shutting off the gasoline at night or when leaving the car for a time is an insurance against loss of fuel by leakage, and by the carburetor flooding, and it is very frequently a prevention of theft, because men who might endeavor to steal a machine would of necessity

have to search for the reason why it could not be started, and would require time at least to learn the cause of the failure of the motor to start.

The illustration at Fig. 6-B shows how an ingenious driver cut the metal skirt between the running board and chassis frame of his car and fitted into it a door with hinges and a catch, so that almost instantly he could reach the petcock, which was close to the frame. The petcock was practically inaccessible before the change.

Fitting Piston Pins.

When a piston and the connecting rod has been removed from the cylinder for any reason the condition of the bearing should be learned. There are different ways of retaining the wristpin, one being that where the wristpin is clamped in the split end of the connecting rod, with the

ends oscillating in the bearings in the bosses of the pistons, or sometimes with a ring around the bosses to prevent the ends of the pin touching and scoring the walls of the cylinder and another is with the wristpins fixed in the pistons by pins or set screws. The latter method is seen at Fig. 6-C. When the wristpins are driven out blocks of wood should be used, to prevent damage, and care should be taken to avoid breaking the pistons. When worn the bushings, either in the pistons or the connecting rods, should be renewed. When reassembled the bearings should be snug, but not too tight, else the edges of the pistons will knock against the cylinder walls. Care should be taken to well

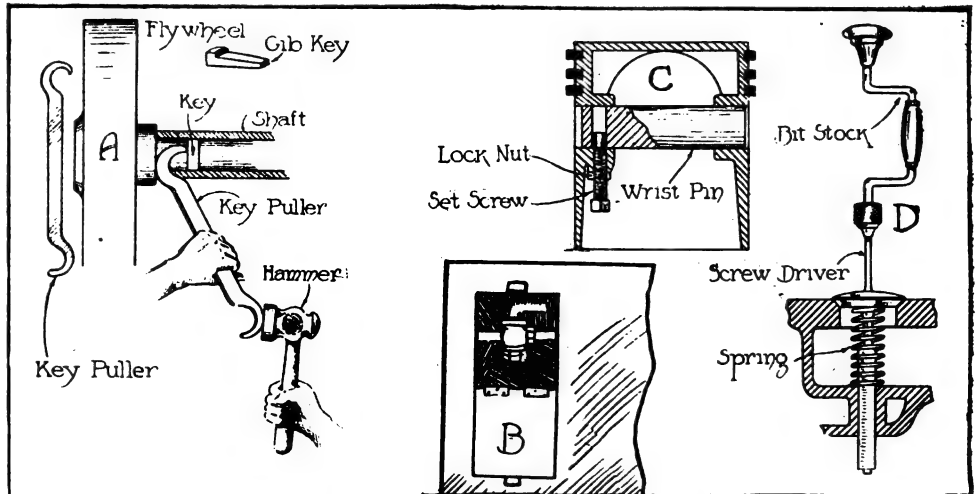


Fig. 6—A, Convenient Tool for Removing Fly wheels; B, Making Fuel Cock Accessible; C, One Means of Retaining Wristpins in Pistons; D, Handy Assembly for Grinding Valves.

lubricate the bearings before the motor is started.

Valve grinding is tedious work, even with the best of tools, because when a job is well done the metal should have a glass finish, which can only be obtained by patience. The metal will vary, so that a condition that may require an hour's work on one seat may not be obtained with three times the labor on another. Hand work is slower, but is also the best, and with a common bit stock and a screw driver blade a good workman will be able to perfectly grind a set of valve ports. The most convenient manner of doing the work with a motor with valve pockets is to fit a spring as shown in the sketch at Fig. 6-D, which will raise the valve whenever the pressure is relieved. The abrasive, either powdered glass or emery and oil, should be ap-

PRACTICAL MOTOR CAR REPAIRS.

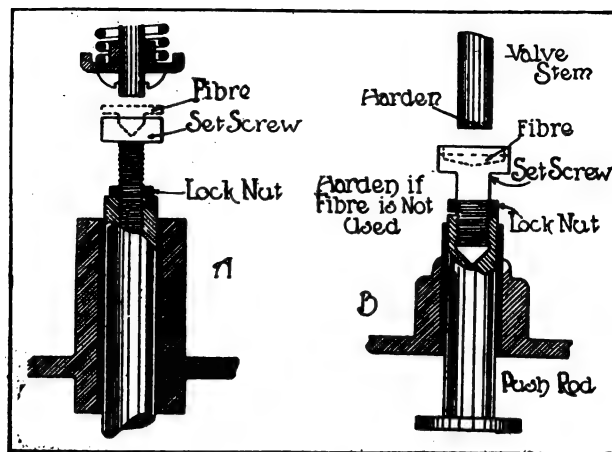


Fig. 7—A, Means of Quieting Noisy Adjustable Tappet Rod by Fiber Insert in Adjusting Screw; B, Non-Adjustable Tappet Converted to Adjusting Type and Silenced by Inset of Fiber.

plied frequently and in small quantities, and only on the bevelled edge of the valve. The valve and the seat should be wiped clean from time to time. The valve should be swung about 90 degrees, or a quarter turn, and comparatively slight pressure should be exerted upon the bit stock. When the valve and seat have been ground with the coarse abrasive, the fine or finishing compound should be used. After the grinding the valves and seats should be thoroughly washed with gasoline.

Silencing Noisy Tappets.

Valve tappets that are noisy may not be sufficiently worn to justify replacing with new, and these can be effectually silenced by the use of fiber inserts that can be placed in the heads of the adjusting screws, if the tappet be of an adjustable type. Exact measurement must be made of the clearance between the valve stem ends and the tappets, with the adjusting screws turned into the tappet rods as far as possible. This had best be done with the engine warm, and always with the valves seated. The tappet rods are removed and each marked so that it may be replaced in the original guide.

French fiber is preferable if the mechanic has a choice of materials. A piece about $\frac{3}{4}$ inch thickness should be selected for each insert, slightly larger than the head of the adjusting screw.

The screws are removed from the rods, the temper is drawn, and they are placed in a lathe and bottomed holes $\frac{3}{8}$ inch diameter, and of such depth that they will retain the inserts, are drilled in the heads. The holes are centered. The fiber pieces are then turned in a lathe until one end of each is a diameter slightly in excess of the $\frac{3}{8}$ inch holes, and this boss is the depth of the hole in length. The fiber is then driven into the hole in the adjusting screw, and when firmly seated all around the remainder of the insert is turned in a lathe to the diameter of the head of the adjusting screw. This process is repeated with all the tappet rods. The screw heads, if battered by the valve stem ends, can be smoothed with a file. The form of the inset is shown at Fig. 7-A.

At Fig. 7-B is shown a method for fitting non-adjusting tappets with screws so that they may be adjusted. If the tappet guides are high they can be cut off so there will be sufficient space for fitting the screws and nuts, but if there is not the desired clearance, which must be determined by measuring the screws and the space between the tappet guides and the valve stem ends, then the valve stems and the springs must be shortened. If the clearance will permit, the tappet guides and tappets can be cut off. In such an event the valves need not be removed.

For cutting the tappets the temper must be reduced by heating. After the annealing and cutting the tappets are drilled with holes 5-16, $\frac{3}{8}$ or even half inch diameter, which are sufficient depth so that, when tapped, the adjusting screws may be turned in the full length. The heads of the screws are then turned out, as indicated by the dotted lines, and fiber pieces turned that can be seated firmly when driven into the holes. If no fiber is used the screw heads should be hardened, and if the valve stems are cut these should

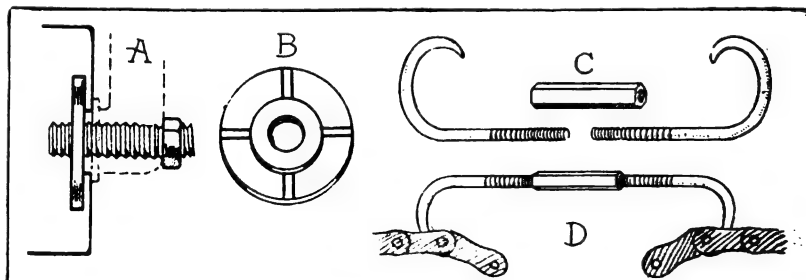


Fig. 8—A, Ingenious Repair of a Water Intake Manifold for Copper Cylinder Jacket; B, the Corroded Jacket Spider That the Threaded Plate Replaced; C, Members of a Practical Chain Clamp; D, the Clamp as Used.

PRACTICAL MOTOR CAR REPAIRS.

also be hardened. When the adjustments of the tappets are made the clearance between the screws and valve stems should be approximately the thickness of a business card, but the only safe timing is by the indicating marks placed on the face of the flywheel.

Ingenious Water Jacket Repair.

Resourcefulness in repairing not only means economy of time and labor, but at the same time restoration of serviceability to what might otherwise be rejected as useless. A repair that illustrates this is shown at Fig. 8-A, it being on an applied copper water jacket. The water intake manifold was retained by bolts that passed through the manifold and screwed into spiders, as seen at Fig. 8-B. The arms of one spider

Those who own or drive motor vehicles that are propelled by chains understand the annoyances incident to removing a link if the chain be worn, or replacing a link in the event of breakage. If the work be necessary in the garage or shop, with tools convenient, it may be quickly done, but without a chain clamp much trouble may be experienced. A very handy chain clamp can be made of two pieces of half-inch steel rod, bent into the form shown at Fig. 8-C, and threaded the greater part of the straight sections, the one left and the other right thread, and a piece of hexagonal steel one inch or $1\frac{1}{4}$ inches section, drilled through and tapped to take the threaded ends of the rods, as assembled as is seen at Fig. 8-D. With this tool and a wrench

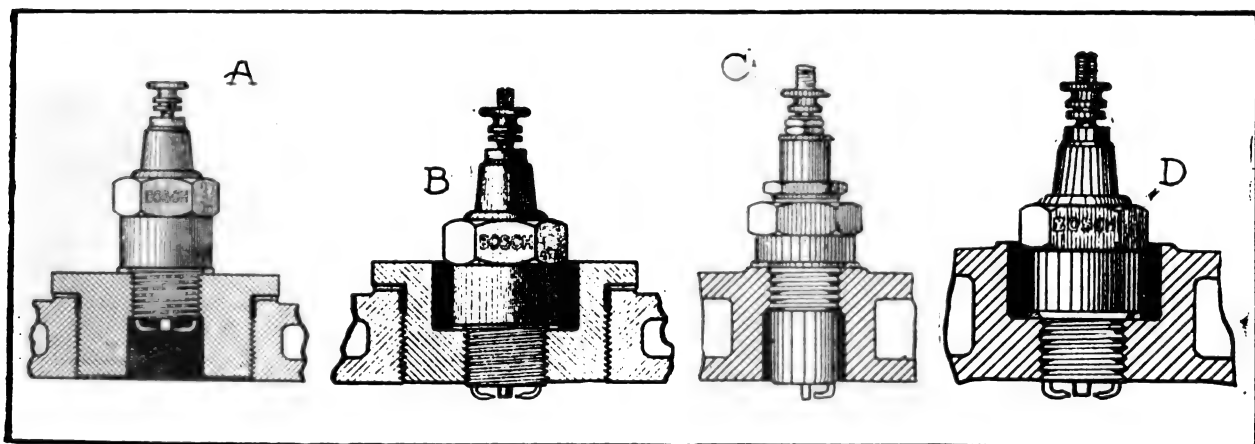


Fig. 8—A, Spark Plug in Valve Cap with Pocket That Prevents Perfect Firing; B, Same Plug Bored to Seat the Plug Electrodes in the Combustion Chamber; C, Plug with Extension Through Cap That Is Not Well Cooled; D, Plug Seated in Cored Cap to Insure Efficient Cooling and Good Firing.

had corroded so that they broke when the manifold was removed. The owner was about to purchase a new cylinder, for the manifold could not be made tight with cement with the other three bolts drawn up snug. A piece of metal nearly as wide as the diameter of the hole in the cylinder jacket and about a half inch longer than its width, was drilled and tapped to take a bolt threaded its entire length. The plate was inserted in the water jacket through the hole and held until the bolt was screwed through it. The outer end of the bolt was then passed through the manifold, and with an outside nut the manifold was drawn up and seated tightly against the jacket, as is seen at Fig. 8-A. The repair was in every way efficient, for the manifold did not leak. The cost was small and the expense of a new cylinder was saved.

that will fit the centre section, a chain can be repaired or adjusted very quickly.

Spark Plug Fitting.

Engine efficiency depends in no small measure upon the spark plugs. The plugs are subjected to intense heat and consequently excessive expansion and contraction. The electric current will follow the path of least resistance, and if there are more than two electrodes will continue through two of these until a change of condition,—burning or other deterioration, will divert it through the others. With magneto ignition the intense spark produced necessarily effects the electrodes, although these are usually of heat-resisting metals.

The spark plug that will afford the greatest efficiency is so located that the spark will be made in the combustion chamber, where the gas

PRACTICAL MOTOR CAR REPAIRS.

will burn quickly and equally in all directions, but a spark plug that is in a recess or pocket, as shown at Fig. 9-A will cause missing and slow ignition. Extreme improvement can be made by boring the valve cap and lowering the plug so that the electrodes are in the combustion chamber, as shown at Fig. 9-B, which will promote quick burning of the gas and a much more satisfactory motor. The spark plug ought to be near the intake port, so that it will be surrounded by fresh gas with each new charge.

The plug, however, should not be exposed to more heat than is necessary to insure good combustion, and preferably it should be in as cool metal as is practical, that the electrodes may not be so heated they will cause preignition, a condi-

Drills are always necessary in fitting accessories and equipment and making repair, and special metals can only be worked slowly with ordinary hand tools.

A drill that is extremely useful is shown at Fig. 10-A, this being mounted on a clamp bracket and so designed that it can be used to drill holes at any desired angle, and it has a screw feed. The range of adjustments is very wide. These are made in three sizes, having maximum drill size capacities of $\frac{5}{8}$ inch, one inch and $1\frac{1}{4}$ inches, and the chucks are adapted for taking either straight shank or standard taper drills. This drill can be clamped on a frame and holes drilled quickly in almost any condition.

The drill shown at Fig. 10-B consists of a

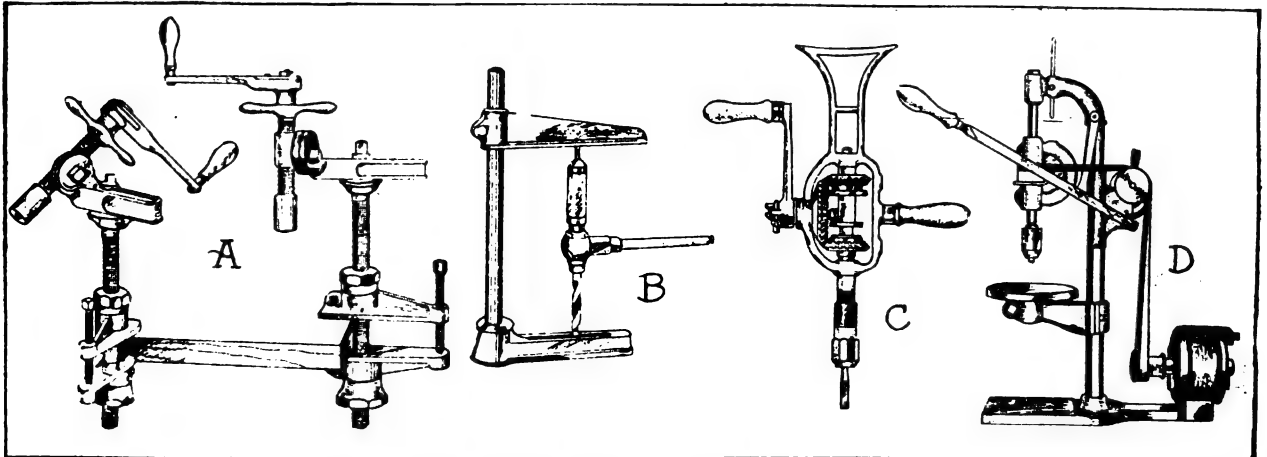


Fig. 10—A, Drill That Has Wide Range of Operation; B, Drilling Post with Ratchet and Screw Feed; C, Ashcroft Combination Valve Grinder; D, Stationary Power Drill for Light Operations.

tion that might result if they project too far into the cylinder. Where the spark plugs must extend through a water jacket, extensions are necessary to prevent pocketing of gas. A plug so located is illustrated at Fig. 9-C, and a means of improving the results is seen at Fig. 9-D, in which the valve cap is recessed and the hole tapped to the bottom, so as to eliminate the pocket and insure effective cooling.

Special Drilling Machines.

Special tools are not regarded as costly investment by good mechanics. Motor vehicle constructions differ greatly, and no matter how carefully the designs have been constructed conditions frequently are such that repairers must spend quite as much, if not more, time making ready for a work as is required to perform it, a result arising from the character of the assembly.

drilling post or "old man," attached to a slotted base that can be clamped in any position by bolts and strap, and a ratchet drill with hand operated screw feed. The arm against which the pressure of the drill is exerted can be raised, lowered or swung as desired. With this drill holes can be made where hand drills could not be used because of the ratchet construction.

The Ashcroft combination valve grinder is illustrated at Fig. 10-C, which generally resembles a breast drill. With this, because of the ratchet attachment, holes may be drilled where the crank cannot be given full swing, holes can be reamed and tapped, and with the automatic oscillating movement of the chuck it may be used with a screw driver for grinding valves.

A small stationary drill, as is seen at Fig. 10-D, may be made very useful in any shop, for it

PRACTICAL MOTOR CAR REPAIRS.

may be located for convenience and driven by a sixth-horsepower electric motor from a lighting circuit. One use is drilling holes in work that is too small for the sensitive drill, or for drilling centres, for considerable time is required to fit a center drill and counterbore and remove the drill from a chuck. Such a tool will take a $\frac{3}{8}$ inch diameter drill.

Building Motor Stands.

When a car is to be idle for several days good judgment demands that the tires be relieved of weight that their usefulness may be prolonged as much as is possible. As the average car owner has a single jack, and this is carried in the machine, a very practical means of preserving the tires is to jack the car and rest the axles on stands that may be placed under them. These can be used to support the axles in the home

by any man with a try square to mark the lines for cutting and lining the legs, a saw and hammer. The supporting arms of the motor must be measured carefully so that the stand will fully support it and yet have sufficient side clearance so that the crank case base can be removed with a wrench. If desired the engine arms can be bolted to the stand, and that this may be done the bolt holes of the arms ought to be at the centres of the side rails of the stand. A stand of this kind will be sufficient for all purposes and will be serviceable for years. It has the advantage of trifling cost.

The stand seen at Fig. 11 E is merely two substantial saw horses of a sufficient height that are converted by the addition of four solid pieces of wood fitted across the legs at either end so that they cannot be separated during the work on the

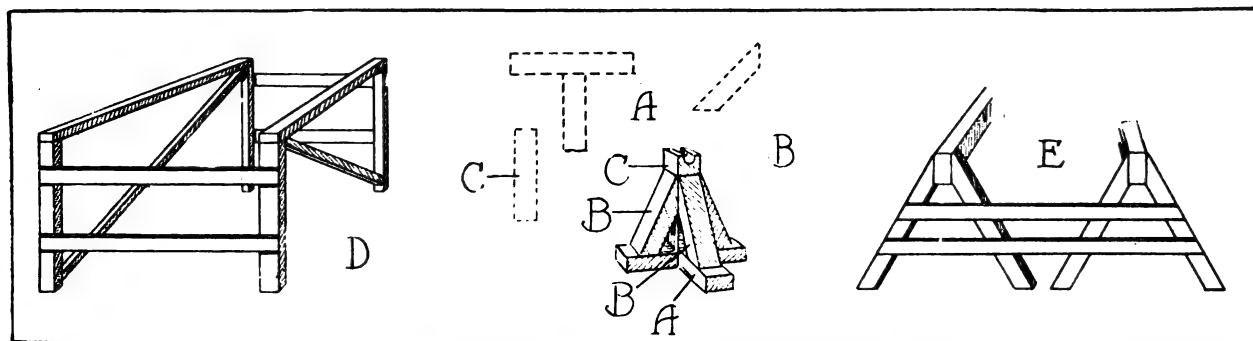


Fig. 11—A, B and C, Components of an Inexpensive Axle Stand; the Dotted Lines Showing the Form of the Members and the Solid Lines Assembled; D, Substantial Frame for Work on Motors; E, Two Sawhorses Assembled for an Engine Repair Bed.

overhaul and when the wheels are removed. These may be made of two by four joist, cut as is shown at Fig. 11 A, B and C, these being six pieces to each stand. If used to preserve the tires the stands should be made so that the tires will clear the ground an inch or more, and the length of the pieces can be determined by measuring the clearance of the axles at the ends of the housing and the yokes. The centre post C should be the length of the clearance, and when this is placed on the T shaped base it will be of sufficient height. These stands can be nailed or screwed together. The depth of the V or groove in the upper end of the centre post should be sufficient to insure against the axle slipping from it. When used for supporting the car on the axle spindles these stands are placed on pieces of plank or timber to afford additional height.

The motor stand shown at Fig. 11 D is constructed of two by four timber and can be built

engine. Care should be taken in spacing them to set the top rails so that the arms of the motor will be well supported.

CUTTING SPEEDS.

Cutting speeds for different metals can be easily estimated. The constants for cutting speeds are: Cast iron, 36 feet a minute; malleable iron, 31 feet; steel, 26 feet; hardened steel and chilled cast iron, 13 feet. Taking these constants, with a section one inch diameter 140 revolutions equals 36.65 feet a minute, and if the section is five inches the number of revolutions is 28, or a fifth of the number required for an inch section. With one inch as a basis of estimate, dividing 140 by the external diameter of the work will give the required number of revolutions to obtain the cutting speed in feet.

YELLOWSTONE PARK FOR MOTORISTS.

The transcontinental motorist may find two impelling attractions added to the scenic assets of the Pacific northwest and serve to accelerate road travel in that part of the country. One of these is a reality, the Columbia river highway; the other is possible, the opening of the Yellowstone Park to motor driven vehicles. Regarding the Columbia highway, Samuel Hill, the well known good roads enthusiast, informs Frank X. Mudd, chairman of the American Automobile Association touring board, as to the great thoroughfare which will begin at Portland, Ore., and skirt the majestic river of the northwest. He says: "You may say authoritatively that the Columbia highway will be open for travel July 1, although only hard surfaced in part. In my opinion the Columbia highway will surpass in scenic beauty any road anywhere in the world".

The effort to secure the admission of automobiles into Yellowstone park is not of recent origin, and John A. Wilson, president of the three A's, is continuing the policy of his predecessors in urging that this national recreation area should be available to modern form of transportation. In a recent communication to Mr. Wilson, E. P. Mathewson, president of the three A's Montana state body, concisely summarizes the situation as follows: "We, of Montana, have felt for some years past that the stage lines in Yellowstone park were not progressive and were not looking to their own best interests in working against the introduction of automobiles. As a rule, the visitor to the park takes the five-day trip. People who are not physically fit are extremely weary after a long ride in the stage coach, and many people who would otherwise visit the park will not go on account of the poor arrangements for transportation. If the good people running the stage lines would substitute the modern sight-seeing automobiles, they would have twice the number of passengers and could charge a larger fee. In addition to this, they would be able to take a much more extended route through the park, visiting points of interest that are never seen by the ordinary visitor".

MERIDIAN ROAD NEARLY READY.

A highway nearly 2000 miles long, running from Winnipeg, Can., to Galveston, Tex., is just about completed. This is known as the Meridian road, and throughout the entire course it has only seven turns from the actual meridian from

which the road takes its name—the sixth principal meridian.

It is claimed that a motorist can traverse the entire 2000 miles without the aid of a guide book, and without changing the gear from high. Kansas built the first section of the road in 1911, and more than \$100,000 has been spent on it in that state. The road is known as a "high gear" dirt roadway, and there is not a foot of rock highway on the 2000 miles. The road is completed from Winnipeg to the Oklahoma-Texas line and is being rebuilt in Texas.

ALL GEORGIA CONVICTS ON ROADS.

All the able-bodied male convicts of Georgia are at work on the public roads. According to the latest reports received by the national committee on prisons and prison labor, over 5000 prisoners, including both short and long-term men, were worked by 124 counties in 1914.

The counties make requisition to the prison commission for the number of convicts they need, the men being worked under the old guard system.

Experience has shown that 15 men form the most economical unit for one guard to handle. The number of units in a gang is determined by such factors as expense a man, mileage of roads to be constructed and repaired, the character of the work to be done, the class of men in the gang and the equipment provided. Gangs, as a rule, average six units, a number easily handled by one night guard, as the men are too tired to give much trouble at night.

The day guards act as road foremen, which lessens the cost of the work. The national committee on prisons and prison labor advocates a change in this system, however, that foremen trained for road work and working with their gangs take the place of guards.

The road work is a great step forward since the days of the lease system in Georgia. The state is building good roads with workmen who receive no wage for their labor, but the committee urges Georgia to follow the lead of Iowa and increase the efficiency of the men by the payment of a fair wage. Georgia will then bid fair to lead the states in the matter of convict road work.

The Missosan Tire Corporation, Denver, Col., has been incorporated with a capitalization of \$3,000,000, to manufacture automobile tires. The incorporators are: S. S. Howard and H. O. Coughlin, both of New York City.

Ford Car Section

For a number of years all articles dealing with Ford cars, equipment and accessories published in the Automobile Journal have been arranged with reference to makeup convenience.

Because of the space required to meet the demands of readers for specific information of Ford machines and whatever pertains to their use, and to better meet publishing requirements, beginning with this issue, all subjects will appear in one department under the caption above.

Commencing with the April 10 number this department will be arranged to include all advertising of Ford car accessories, equipment and supplies, which will afford to those whose advertisements shall appear preferred position, either facing or beside editorial matter.

The editorial contents of this section and the advertising will be separately indexed. This convenience will benefit both reader and advertiser.

New Owners' Department

Their department will be established in the April 10 issue of the Automobile Journal. It will be devoted to information of practical use to men who operate cars. The subjects will be elementary in character and will be greatly diversified. All the articles will be illustrated with comprehensive sketches or halftone reproductions. In this department will be found all that is new in accessories, equipment and supplies, which will also be described and illustrated.

SUGGESTIONS FOR THE NEW CAR OWNER.

Uses of the Three Foot Pedals and Hand Lever by Which the Model T Ford Is Operated—Positions of Each When Functioning Normally.

The 20th article dealing with the construction, operation, care and repair of the Model T Ford automobile deals with the uses of the foot pedals and hand lever by which the clutch is operated and the several speed ratios of the planetary gearset are obtained. The control of the car is practically dependent upon the use of these components.

INSTALLED in the footboard of the car, directly back of the steering column, are three foot pedals, each of which projects through a metal plate in which are three slots, in each of

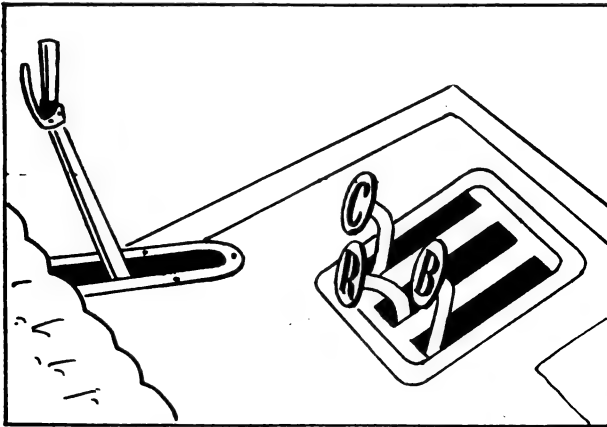


Fig. 38—Car Stopped, with the Hand Lever Setting the Rear Wheel Brake, the Clutch Pedal in Neutral, and the Other Pedals Normal.

which a pedal may be moved longitudinally. At the left side of the footboard is a lever handle, on which is a latch, that may be moved forward and backward in a metal-bound slot. The steering column is fixed so that the steering post, to which the wheel is secured, may be turned in it. Seated directly back of this post the three pedals can be easily reached by the driver's feet, and the lever is conveniently at the left hand.

In the operation of the car both hands and both feet are often used. Generally both hands are on the steering wheel, the ignition lever being moved by the fingers of the left hand, and the throttle lever by the fingers of the right hand, there seldom being need to remove the hands to swing these. The levers are beneath the wheel and when once located the levers are retained by notches in the quadrant on which they are swung.

On each of the pedal levers is a steel pad on which is a single letter, which designates the

use made of it. That at the left is the clutch pedal, defined with a C, the centre pedal is marked with an R, and the right pedal bears a B, these indicating reverse and brake respectively.

Each pedal has a special function when used singly or in combination with the others or the hand lever, and special attention is directed to the sketches which show the position of these in connection with the starting and stopping of the car, and driving in high or low speed ratios, or in reverse. The pedals are shown without obstruction of the view, and the positions are intended to be those that shall be found in a machine that is normal or standard in its operation.

Considering their Use In Sequence.

In considering these pedals and the lever and their use the reader must understand that the operation defined as driving includes in sequence the preparation of the car for starting, starting (at low speed), high speed, in reverse, stopping and stopped. By studying the accompanying sketches, which show the relations of the pedals and levers for each of these conditions, without explanation, the owner could learn to drive carefully and well. These combinations will be varied from somewhat with reference to position of the pedals as the car is used, because of wear that will require compensation from time to time, but the nearer these are to the relations

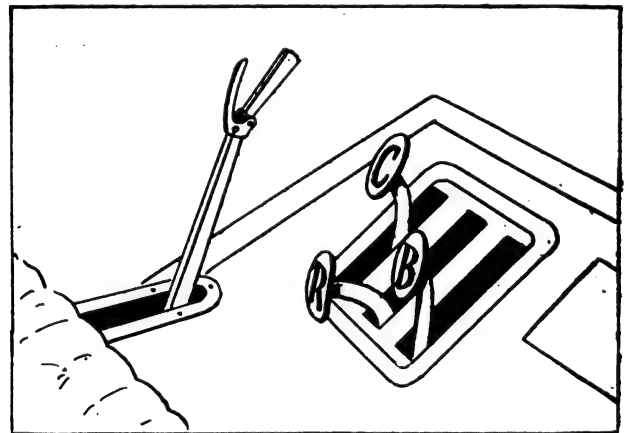


Fig. 39—Low Speed, with the Clutch Pedal Engaging the Gearset Band, the Hand Lever Set in Full Forward Position, and the Other Pedals Normal.

shown the better will be the machine so far as operation is concerned.

Driving Should Be to Formula.

The owner ought to begin to drive according to formula, that is, each arrangement of the pedals and lever should be made in the same manner, so there will never be possibility of confusion. The clutch pedal should always be moved by the left foot, and the service brake pedal with the right. The reverse pedal is least used, and this should be operated with the left foot for reasons that will be shown. The lever is always operated by the left hand, which leaves the right hand upon the wheel at all times the car is in motion.

The lever has three positions when operated. The lever is linked with the clutch pedal and these two are always used in combination when in low or high speed. The other pedals are each independent of these two. The latch of the hand

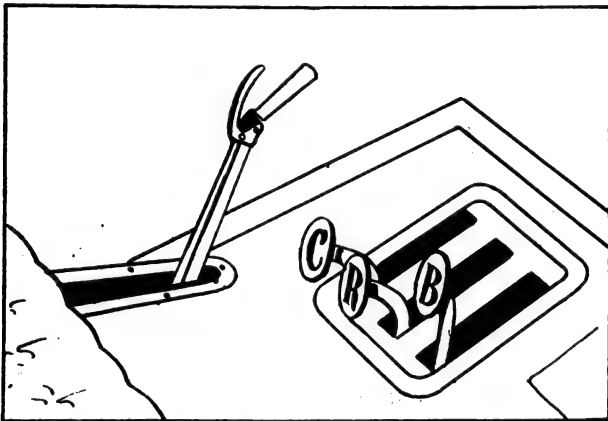


Fig. 40—High Speed, with the Hand Lever in Full Forward Position, the Clutch Pedal at Extreme Rear of the Slot, and the Other Pedals Normal.

lever will always secure it in the position in which it is placed, and the latch must be opened to move it, this being a security against it being accidentally moved or becoming loose through wear. When the car is stopped the hand lever ought to be drawn back as far as it can be moved, which will set the rear wheel brake. While this may not be necessary if the car is in a garage, the brake should be set if the machine is on the street, and Fig. 38 shows the lever in position to lock the brake, with the clutch pedal in neutral and the reverse and service brake pedals in normal. The angle of the lever is somewhat exaggerated in this sketch, the desire being to indicate beyond doubt where it should be.

Lever and Pedal in Neutral.

The second position of the lever is directly upright, or in neutral. When in this position

the clutch pedal is also in neutral,—that is, the engine may run idle and the car is inoperative, provided neither the clutch pedal or the reversing pedal are used. The car should never be cranked with the lever in any other position than that setting the wheel brake, for should by any chance the low speed transmission band bind the machine will not move ahead toward the driver, or, if the machine be on a gradient, either ascending or descending, the car cannot be started from the vibration of the engine or the swaying caused by cranking. The lever, then, should only be moved from the rear position to the centre, or upright, when the driver is seated and in readiness to start the car.

The third position of the lever is forward as far as it can be pushed without exerting severe pressure, as seen at Fig. 39. The effect of this movement is to permit the engagement of the multiple disc clutch, for the clutch is maintained neutral until the lever is moved forward. The lever, the reader will remember, can be set in any of the three positions.

The lever and the clutch pedal are interlocking. The clutch itself is a series of plates that are lubricated by oil and which, when the plates contact with each other, will transmit the torque of the motor direct to the rear axle. When the lever is neutral these plates are kept separated. The car is driven in the low or the reverse ratios by contracting the bands which encircle the gearset, but neither of the pedals that operate these bands can be set.

Lever and Clutch Interlocked.

The clutch pedal ought always to be in neutral when the hand lever is upright, but if the clutch pedal is in the forward position, where the clutch is engaged, the movement of the hand lever backward, so it is upright, will always bring the clutch pedal into neutral. That is, if the car is moving with the clutch engaged, the movement of the lever backward will disengage the clutch. The reader will understand that if the hand lever is neutral the clutch pedal must also be neutral. But the backward movement of the lever to set the wheel brake does not influence the clutch pedal.

When the car is first started it must be driven in low speed, for the direct application of the power would not only strain the mechanism, endangering the shafts and pinion and gears of the driving system, but would, if the motor were turned slowly, cause a jump of the car that would throw the passengers forward. Were the engine speed comparatively slow the machine would start violently, a result that would be decidedly

uncomfortable were there no other considerations, and which is, of course, entirely unnecessary.

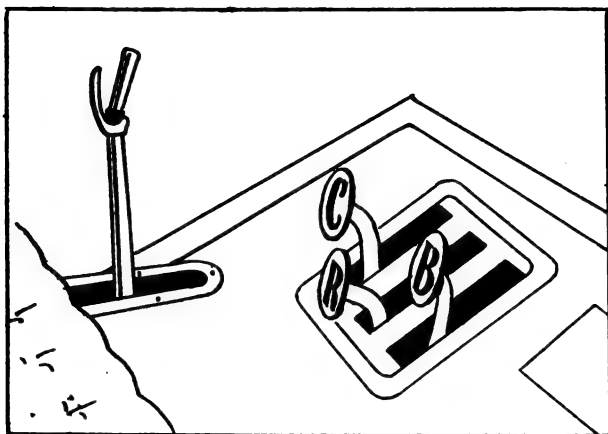


Fig. 41—Stopping, the Hand Lever and the Clutch Pedal in Neutral, the Service Brake Set and the Reverse Pedal Normal.

To start the car with the lever and the clutch pedal neutral the clutch pedal is pushed forward, and this forward movement will be about two inches before the low speed transmission clutch or band will be engaged. This position is shown at Fig. 40. As the car begins to move the speed may be whatever may be desired, for the clutch band may be so lightly constructed the gearset will slip more or less within it, or if drawn so tightly the gearset will not slip, the speed will be the full ratio. The pressure upon the clutch pedal will for these reasons determine the speed of the car with the low ratio. If the pressure is lessened or the clutch is released the car will lose its headway, for the spring tension that separates the clutch band must be overcome by foot pressure before the band will hold, and this pressure must be exerted all the time the car is driven in low speed.

With the lever neutral, the clutch pedal may be moved forward until it is stopped, and if released it will be forced backward to neutral. To drive the car in high speed the lever is pushed forward as far as it will go and the clutch pedal allowed to go backward easily as far as it will, in a position seen at Fig. 40. Care should be taken not to let the pedal back quickly, for this will cause the clutch to engage suddenly with the accompanying shock or jolt that has been explained. In this position the car can be driven with any variation that can be obtained by varying the positions of the spark and throttle levers without touching the pedals or the lever.

In stopping the lever should be drawn back-

ward to neutral, which will permit the machine to move ahead by momentum, and to reach a precise place the clutch pedal is pushed forward to the low speed position and the car controlled by pressure applied upon the brake pedal. The pedals and levers are then as seen at Fig. 41. The brake pedal should move forward from an inch and a half to two inches if the adjustment is normal, and when the pressure is released the pedal will return to the usual position.

When in reverse the hand lever is neutral and the left foot should be on the reverse pedal and the right foot on the brake pedal, for certain control is imperative. The pedal positions are seen at Fig. 42. The car can be driven in reverse only so long as pressure is applied to the pedal, and this band can be slipped, as has been stated of the clutch band, so that the speed in reverse can be any variant from bare movement to the maximum, and the brake pedal can be used to stop the machine after the reverse pedal has been released.

Driver Will Learn "Feel" of Car.

The driver will quickly learn from the "feel" of the car when the hand lever is neutral, for the machine will begin to lose momentum as soon as the clutch is disengaged, and to what extent the clutch and the reverse bands slip. The foot brake band will always slip, the slippage depending upon the pressure, and if necessary the hand lever can be thrown backward and the brake pedal pressed, thus using both brakes. In an emergency the clutch and reverse pedals can both be pressed upon, this having the effect of

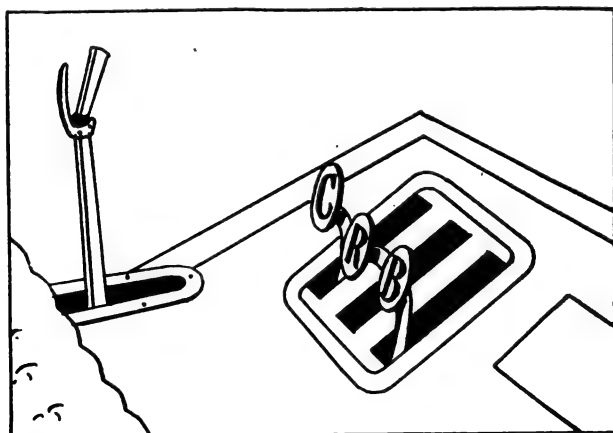


Fig. 42—Reversing, the Hand Lever and the Clutch Pedal in Neutral, the Reverse Pedal in Forward Position, and the Service Brake Pedal Normal.

holding the car, for the low speed will tend to drive it ahead and the reverse to drive it backward, and the one offsets the other, holding the

driving shaft by the engine power applied from either direction. This may be resorted to should the foot brake or hand brake fail to stop the machine, but is not advised save in an emergency, for it causes heavy strains on the mechanism.

How to Use the Brakes.

The driver should endeavor to control the stopping of the car, unless the need is emergent, with as little use of the brakes as is possible.

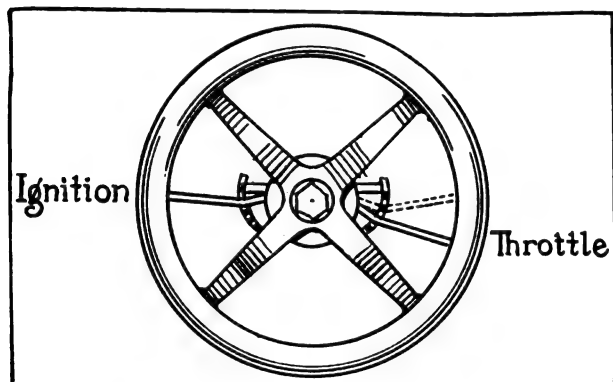


Fig. 43—Positions of Ignition and Throttle Levers for Cranking, the Former Slightly Advanced and the Set of the Latter Indicated by the Dotted Lines of the "Closed" Throttle.

There are numerous reasons for this statement. The brakes are undoubtedly for use, but with rare exceptions the driver abuses the car by careless or ignorant use of them. To illustrate: When about to stop the hand lever should be thrown into neutral and the low speed used, slipping the clutch, if necessary, to bring the car to the exact place of stopping. Or the foot brake can be applied slightly. The clutch should always be disengaged or slipped when turning corners, permitting the machine to run by momentum, without moving the hand lever, and with the release of the clutch gently the speed can be regained without strain or stresses.

The wheel or emergency brake should be only used when there is need of stopping quickly, and never with the clutch engaged. The clutch is ample and it can be slipped with confidence that it will endure, and with a clutch slipping the driver can move a car as slowly as he pleases. When a car is stopped on a grade the machine can be set with one wheel against a curb or a bank or a stone so that it will not move from gravity when the hand brake is released for starting. Good judgment will dictate leaving the car where one will not need to depend on an obstruction, but in frequent use one cannot always choose a place for stopping.

When one is driving around curves the speed

should be slower than where the roadway can be seen, and the readiness of the clutch and service brake for use is always advised. When one is about to ascend or descend a grade good judgment demands that the driver know that the service brake and emergency brake be operative, and the condition can be determined by trying them. This is a wise precaution, because the driver cannot take chances with his own life or the lives of others, even though there are no property considerations involved. Ascending steep grades the low speed should be used, for there is no reason for working a car excessively, even though the ascent could be made with the high speed, and the time one gains is often paid for dearly by the abuse of the machine.

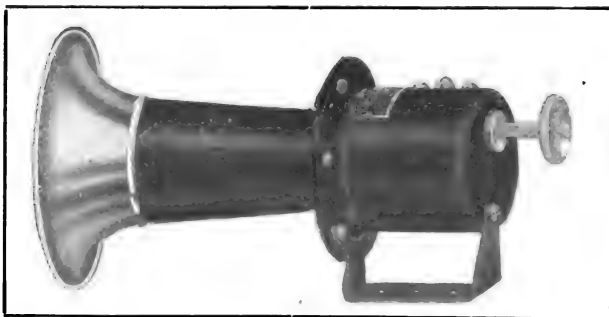
Descending steep grades the driver had best drive on the low speed, which will use the engine for a brake, and both have the service and emergency brakes in readiness for use, or the engine speed can be reduced as low as possible, or the ignition cut out, which will cause the motor to run against compression. There is one rule that a driver can safely follow, and that is to go slowly, or even stop, rather than take chances of any kind. When experience has been gained this admonition is equally as well founded.

(To Be Continued.)

NEW KLAXON HAND HORN.

Lovell-McConnell Manufacturing Company Announces a \$4 Hand Signal, Ready for Delivery May 1.

The Lovell-McConnell Manufacturing Company, Newark, N. J., maker of the well known Klaxon automobile warning signals, announce a new hand operated horn which will be ready for delivery May 1. It will be known as the Hand Klaxonet and will retail at \$4. The Hand Klaxonet is operated by a plunger which projects from the back instead of from the top, and with a slight touch



The New Klaxon Hand Horn.

will create a very loud sound. The Hand Klaxonet is to be sold with the usual Klaxon permanent guarantee and will have Klaxon quality throughout. Dealers who desire to sell these horns should write to the company's Newark office and mention seeing the advance notice in The Automobile Journal. They will receive prompt reply stating full details.

MOSCO FORD SPECIALTIES.

The Motor Specialties Company, Waltham, Mass., Produces a Full Line of Desirable Fittings.

In its 1915 catalogue, which also includes a revised



Fogg Horn With Cut-out.

price list that will interest dealers and garage men, the Motor Specialties Company, Waltham, Mass., illustrate and describe a large number of its Ford fittings. The line ranges from the Fogg Horn, shown in an accompanying illustration, to wheel pullers, top bow holders, Bemus Ford timers, Mosco shock absorbers, Mosco power tire pumps, Master vibrators, anti-rattlers for doors, steering and radius rods, Excel jacks, etc. This catalogue is free to dealers and garage men upon request, and by mentioning the Automobile Journal.

The 1915 model Fogg horn is provided with a cut-out, which is a new feature. The horn is located on the exhaust pipe between the engine and muffler and is controlled by two foot pedals and serves the purposes of two appliances, a muffler and a signal horn. At low engine speeds it delivers a full, mellow signal. One of the pedals is of the locking type to hold open the cut-out when so desired. The horn can also be used on a Metz car.

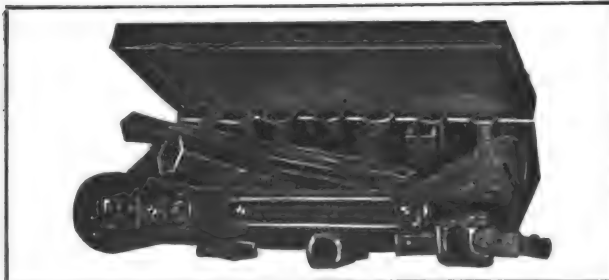
The horn is sold either with or without the cut-out, selling at \$4.50 in the former case, and \$5 in the latter combination. It is packed in a carton for shipment and then measures over all $12\frac{1}{2}$ by 4 by $4\frac{1}{4}$ inches, weighing less than 3½ pounds. Each appliance is guaranteed for the life of the car.

MOSSBERG MASTER TOOLS.

Ford Car Owners and Dealers Can Obtain a Complete Line of Wrenches for Almost All Purposes.

The Frank Mossberg Company, Attleboro, Mass., makers of the widely known Mossberg wrenches and specialties, is producing a complete line of tools for use upon the Ford car, especially the model T. This car requires many special tools, and the Mossberg specialties are designed to minimize the time and labor in adjustment or repair work on the chassis, etc.

The accompanying illustration shows set No. 15 A, which consists of a special socket wrench set for Ford cars, and sells for \$5.50. This set includes a reversible ratchet handle, No. 350, a tubular extension bar, a



Mossberg Master Tools.

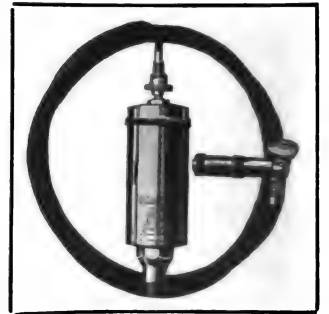
universal joint, a screw driver bit, a spark plug socket 31-32 of an inch in size, designed to fit Ford plug, and 10 guaranteed sockets. Seven of the sockets are hexagonal and of sizes 17-32, 19-32, 21-32, 23-32, 25-32, 29-32

and 31-32 of an inch. Two are square, made to fit 1915 main bearing bolts, sizes 10-32 and 15-32 of an inch, while one oval socket is provided to fit main bearing bolts designed previous to 1915.

UTILITY AUTOMATIC TIRE PUMP.

Certain Protection Afforded by a Whistling Pneu-Meter Which Prevents Over-Inflation.

The Hill Valve Pump Company, Chicago, Ill., is marketing a motor-driven tire pump that is automatically controlled so that over inflation is impossible. The pump is of the spark plug type, the air being forced through a flexible tube tested to 1,500 pounds pressure. A large knurled nut provides easy attachment to the tire valve. The controlling device, known as the Pneu-Meter, is attached to the tube at the valve, and when the required amount of air is forced into the tire, it automatically closes the valve and provides an outlet for the air that is thereafter pumped. The air rushing through the outlet causes a shrill



Automatic Tire Pump.

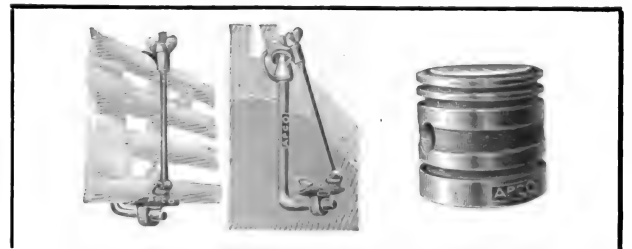
hissing or whistling noise which is sufficiently loud to attract the attention of the motorist. A feature of the device is that though the engine is allowed to run indefinitely, no air beyond what is necessary to inflate it to the pressure set can enter the tire; thus over inflation is prevented. The Pneu-Meter is so constructed that adjustment for any required pressure can be easily and quickly made. It is provided with a table of pressures for the various sizes of tires, and a corresponding table which shows the pressure point at which the device should be set, which is quickly accomplished simply by revolving the outer sleeve of the Pneu-Meter until it clicks. It can be set from 50 to 125 pounds pressure. It can be used with any power or hand pump.

The Utility automatic tire pump unit is a compact accessory, made of polished brass, nickel, and blued steel. The Utility (large size) sells for \$10. The Utility Junior (Ford size) sells at \$6. The Pneu-Meter is sold in combination with the pump, but when sold separately the price is \$2. The manufacturer guarantees that if it does not give satisfaction the purchase price will be refunded. Further information can be obtained by addressing the Hill Valve Pump Company, 18-20 E. Kenzie street, Chicago, Ill., and mentioning The Automobile Journal.

FIVE NEW APCO DEVICES.

The Auto Parts Company, Providence, R. I., Has Increased Its Line of Accessories.

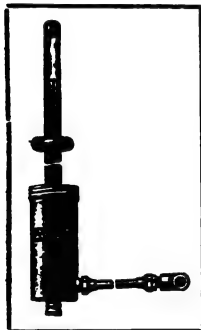
The Auto Parts Company, Providence, R. I., manufacturers of the well-known Apco line of specialties for Ford cars, is offering the trade five new devices which



Apco Bow Clamp (At Left) and Apco Piston.

will recommend themselves to owners because of their practical qualities and reasonable prices. The Apco

pistons, shown herewith, are made of the best grade of close grained gray iron and are carefully and accurately ground to sizes. They are produced to conform to the dimensions of the Ford piston, and are also made in .005, .010 and .015-inch over-size for service with worn cylinders. These over-size pistons are particularly efficient in preventing oil from escaping past the rings and for improving compression. The Apco pistons come equipped with wristpin and bushings and rings. They retail for \$1.50 each.



Dash Oil Gauge.

sells for \$1.50.

The new Apco bow clamp for preventing the rattling of the Ford top is a big improvement over the former Apco design. As may be noted by the accompanying illustrations, which show the top down and raised, with the clamp in position, provision is made for adjusting the clamp as desired. The Apco bow clamp can be installed in a few minutes, comes finished in black enamel, and is made for both Ford runabout and touring car. It retails for \$1.00 the set.

To protect the filaments of the headlight, which are frequently broken by the vibration of the Ford motor, the company is offering the Apco headlight brace. This device prevents the lamps from vibrating, and is adjustable to any model Ford car. The Apco headlight brace comes finished in black enamel and sells for 50 cents.

The new Apco brake rod supports differ radically from those marketed in that they do not have to be disassembled to instal and provision is made for automatically lubricating the brake rod. The brake rod can be slipped into the support by forcing back a plug with the thumb. The space in back of the plug is filled with grease which finds its way to the frictional surfaces through apertures in the plug. The brake rod supports are constructed of semi-steel, sheradized to prevent rusting, and prevent the brake rods from rattling. The maker claims that it is the only device of its kind marketed that has the self-lubricating features. They retail for 50 cents a set. The bronze members list at \$1.00 a set. The Apco specialties are sold under the guarantee of "satisfaction or your money back." Further information will be supplied to those who write the Auto Parts Company and mention The Automobile Journal.

FEDERAL TIRE SERVICE COMPLETE.

Well Known Milwaukee Concern Co-Operating to Insure Satisfaction.

The Federal Manufacturing Company, Milwaukee, Wis., manufacturer of the Federal double-cable-base tires, has a service for its dealers and customers that is business promoting from every viewpoint. Federal tires, rugged or plain treads, are made of pure para rubber and best quality "square" woven fabric. Double-cable-base construction eliminates rim cutting, tube pinching, side wall blowouts and the danger of slipping from rims. Claim is made that Federal tire users are free from these annoyances and causes of expense. It is worth any dealer's while to write the company and secure full details of its selling plan.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Clean Carbon From Cylinders

COMPLETE
GENERATING AND
DECARBONIZING
OUTFIT

\$15



Not too large for the small garage or shop, but large enough for any business a shop can do.

A complete equipment, fully guaranteed, and extremely economical to operate.

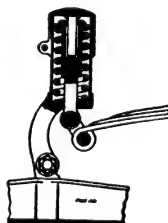
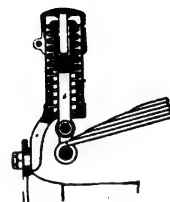
No tanks to handle, with material always ready, any person can use it and make money.

Will clean carbon from a cylinder in three minutes. Oxygen is generated in three minutes.

Saves time labor and material, and does the best work science can conceive.

"O.G." Ford Shock Absorbers THE SET OF FOUR \$9

Can be attached in 15 minutes, are adjustable when attached, and are automatically adjusted by the load. Thoroughly lubricated by grease cups. No rattle or squeak. Sold with a guarantee for satisfaction during the use of the car, covering material, workmanship and complete absorption of shock. Purchase price refunded if not satisfactory. Method of attaching to rear spring of Ford car is shown by this illustration.



Extreme spring action with this absorber attached to the front spring is shown in this illustration of the manner of installation. The spring tension is adjusted by turning the cap, lessening or increasing the pressure.

No questions asked if refund is requested. The user is the one who must be satisfied.

Write today for Jobbers' and Dealers' Discount Sheets and Special Literature.

Oxygen Generator Co.
301 River Street TROY, N. Y.

How to Get Service From Your Car

Correct diagnosis of its lubricating needs is the first essential. The use of oil that thins out, as many do, when the engine heats up will cause as much trouble as failure to replace the oil consumed.

Your motor must have oil that retains the correct body at its working temperature, that envelopes every reciprocating part in a protecting film of oil, saving friction and excessive wear. Hundreds of thousands of owners have found it in

Polarine

POLARINE maintains the correct lubricating body at any motor speed or temperature, whether the thermometer on the street registers zero or 100 degrees. No danger of burned-out bearings or scored cylinders, no annoyance from noisy operation. Friction reduced to a minimum. Double filtration practically eliminates carbon deposits.

If you have your own garage you can make a big saving by buying POLARINE by the half barrel. You will use this quantity in a season's driving, so such an order is both an economy and a convenience.

POLARINE is made by the great organization whose watchword is service. Like every product, it is sold with the guaranty of satisfaction and may be had everywhere.

STANDARD OIL COMPANY

(An Indiana Corporation)



Chicago,
U. S. A.

**RED CROWN
GASOLINE**
More Speed
More Power
More Miles
Per Gallon

(298)



Make Your Old Tires New!



Goodyear Inside Tire Protectors

Put one inside that old casing and get the last mile out of it. Saves at least ten per cent of your tire bills by making tires run more miles. Makes the casing serve until the very last layer is worn out.

You can easily place a tire protector in your tire, without experience. And it can be used again and again.

In sizes to fit all standard makes, at Goodyear Dealers. Prices as low as \$3.50. Ask your dealer to show you one, or address Desk 46.

GOODYEAR
MAKING RUBBER

The Goodyear Tire & Rubber Co., Akron, Ohio
Makers of Goodyear Automobile Tires (2080)

20,000 GUARANTEED

When you have anything to say to those in the automobile industry use straight trade talk copy in the

Accessory and Garage Journal

The only strictly automobile trade paper published in America

Automobile Journal Publishing Co.

Publishers

AUTOMOBILE JOURNAL **MOTOR TRUCK**
Times Building, Pawtucket, R. I.

STUTZ

OFFICIAL ROAD RACE CHAMPION

The success of Stutz racing cars in contests means greater power and stronger parts in the vital places guaranteeing longer life and better service on the road. Write for literature.

STUTZ MOTOR CAR COMPANY, INDIANAPOLIS

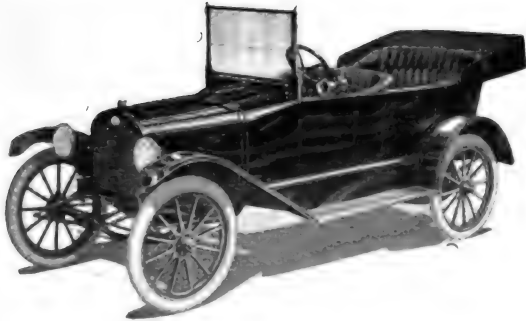
THE MOTOR TRUCK

*A Leading Authority in the
Commercial Vehicle Field*

12 Issues

\$2.00 the Year

When Writing to Advertisers, Please Mention The Automobile Journal.



METZ '25'

The Quality Car

\$600 Equipped Complete

Including Gray & Davis electric starter and electric lights, rain-vision built-in wind shield, instant one-man top, Bosch magneto, Hyatt bearings, built-in gasoline gauge, speedometer, signal horn, etc. Standard tread, 108-inch wheel base, 32-inch wheels, 3½-inch Goodrich clincher tires.

The more a prospective purchaser knows about cars, the easier it is to sell him a Metz. We would like to hear from wide awake dealers who appreciate what this means. Write for new catalog "Q".

METZ COMPANY, WALTHAM, MASS.

EISEMANN

The most simple—the most accessible—the most durable—the most efficient magneto ever produced in the new Type G-4.

The Eisemann Magneto Company

Sales and General Offices,

32-35d St., Brooklyn, N. Y.

New York, N. Y., Indianapolis, Ind., Detroit, Mich.

123 W. 52nd St. 415 N. Capitol Av. 802 Wd' d Av.



REXO III \$3⁸⁵

The GARFORD MANUFACTURING COMPANY, 2506 Olive St., ELYRIA, O.

Successors to THE DEAN ELECTRIC COMPANY.

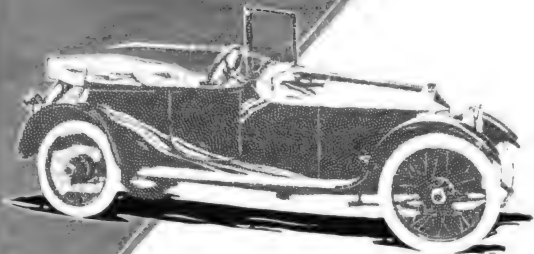
THE MOTOR TRUCK

A Recognized Authority in the
Commercial Vehicle Field

12 ISSUES \$2.00 THE YEAR

When Writing to Advertisers, Please Mention The Automobile Journal.

LUXURY



THE motor car today has a business and social significance. Your choice of a car is a reflection of your judgment and taste as surely as your selection of your home and its furnishings.

Scripps-Booth

luxurious light cars offer in minimum weight, with the most advanced construction and appointments, a Pride-value beyond that of any other motor car.

Owners of large touring cars and limousines will be interested to see this light car that measures up to every standard of motor car luxury.

Scripps-Booth cars are now awaiting your inspection at the dealers'.

Scripps-Booth Company
Detroit, Mich.





Pyrene
TRADE MARK
FIRE
EXTINGUISHER

APPROVED!
NATIONAL BOARD OF FIRE UNDERWRITERS

The PYRENE protection is so certain that insurance companies reduce the premium you pay if your car is Pyrene equipped. This is based on cold business judgment—the underwriters know the value of the PYRENE EXTINGUISHER. Their insurance represents money, and they believe in safeguarding it.

PYRENE EXTINGUISHERS are good for an indefinite period, and in more than one car. They are the best investment a car owner can make. Require little space, can be carried without inconvenience. Pyrene Brass and Nickel-Plated Extinguishers, one quart capacity are included in the lists approved by the National Board of Fire Underwriters.

Pyrene Company of New England
88 Broad Street Boston, Mass.

**SAVES 15 %
ON YOUR
CAR INSURANCE**

TRADE MARK REGISTERED IN
NON-FLUID OIL
UNITED STATES PATENT OFFICE

Recognized as the **high-est grade** lubricant on the market. Consistently retains the patronage of the great majority of car owners who **know** that the **best** lubricant is the **cheapest**, because it protects their car investments **most surely**.

Automobile manufacturers recommend it. Try it out on your own car.

"K. No. 00 Special" grade for sliding gear transmission.

"K. No. 000" for differential, compression cups and all bearings.

Reduced prices for 1915. Ask your dealer.

Sold by leading dealers everywhere. Look for the orange-colored can bearing sprocket-wheel trade-mark shown above.

New York & New Jersey Lubricant Co.
165 Broadway, New York. 1430 Michigan Ave., Chicago, Ill.

Trade Names

All Industrial names ready at instant notice. All lines separate.

*The Most Complete List
of Trade Names
Known*

100% ACTIVE

Write for particulars

ACCESSORY AND GARAGE JOURNAL

Times Building, Pawtucket, R. I.

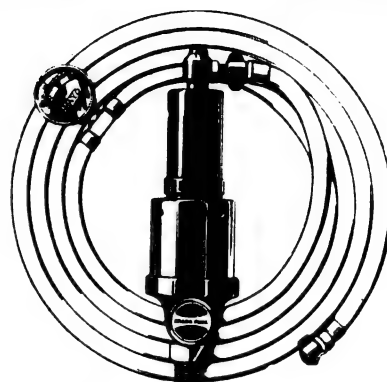
(When Writing to Advertisers, Please Mention The Automobile Journal.)



REG. U. S. PAT. OFFICE

The wise motorist knows, as well as we know and as well as automobile engineers know, that the magneto is the most effective ignition equipment, and that cheapness is the sole recommendation for any other form of automobile ignition.

SPLITDORF ELECTRICAL CO.
NEWARK, NEW JERSEY



Try One Free On Your Car for 30 Days

If at the end of that time the Mayo has not proved itself the equal of *any* pump, regardless of price, return it and we will gladly refund its full purchase price. We won't be satisfied unless *you* are.

MAYO SPARK PLUG PUMP

Why *pay* more than \$10 for a pump that won't *do* more than the MAYO?

The MAYO is the pioneer of all power pumps. Has been making good for years. Standard equipment on a number of cars.

Guaranteed to pump pure, fresh air taken from the atmosphere only. Built with metal rings like a motor, and will last as long. Instantly substituted for any spark plug. No machine work required—no costly work of installation as with other pumps. Ready for work the minute you get it. Inflates largest tire in 2 to 4 minutes. Fits any toolbox. Weight, 2½ lbs.

Price, complete with 12 ft. hose and gauge, \$10. MAYO Q. D. Spark Plug, \$1.50 extra. MAYO Ford Pump, \$8 complete. MAYO Valve Cap Pump for permanent attachment to motor, \$15.

Write for full information. Dealers wanted everywhere.

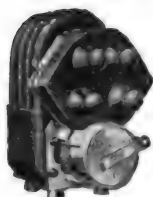
MAYO MFG. COMPANY

66 E. 18th St.

CHICAGO, ILL.



Model BX-4



HEINZE



HEINZE MAGNETOS have proven superior in all competitive tests. This superiority is your guarantee of FREEDOM from ignition troubles.

HEINZE ELECTRIC COMPANY

Sales Offices—Detroit, Michigan.

Factories—Lowell, Mass.

Service Stations—New York, Detroit, Chicago, Minneapolis

AUTOMOBILE ELECTRIC LIGHTING SPECIALTIES

For the Automobile Owner and Manufacturer who wants SERVICE for his money

ELECTRIC LIGHTING SPECIALTIES Made to Order

CULVER-STEARN'S MFG. CO.

Worcester, Mass.

Detroit, Mich.

Tarvia

PREVENTS DUST
PRESERVES ROADS

Booklets on request

BARRETT MANUFACTURING CO.

New York, Chicago, Philadelphia, Boston, St. Louis, Cleveland, Cincinnati, Pittsburg, Detroit, Birmingham, Kansas City, Minneapolis, Salt Lake City, Seattle.



(When Writing to Advertisers, Please Mention The Automobile Journal.)



FOUR large factories in four different countries are busy turning out the Zenith. The leading cars of Europe use it. Nine prominent American makes are already converted. In export fields alone the Zenith equipped car has tremendous prestige. You can learn why in the catalog. Ask for it.

ZENITH CARBURETOR CO. DETROIT, MICH.

Trouble Hunts Among the Floats

MANY diverse operations are necessary in turning out the high grade Zenith Carburetor. Not the least important of these lies in the testing of float and float chamber under actual working conditions.

On long racks the carburetors are set up with floats and needle valves in place. Temporarily attached to each float chamber is a gauge glass showing the level of the gasoline. The operator adjusts the gasoline valve to the required level and thoroughly tests the float action. Leaks in the castings are also noted. Nothing "gets by" these Zenith inspections—there is too much at stake.



ALDING PORCELAIN PLUGS

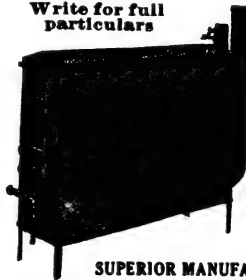


Regular
75c Value

50c
EACH

Write for a gallon of the famous
"ALDING" Oil, in "DUCK" Can, 75c Delivered
ALSTEN & GOULDING COMPANY
36 Foster Street, Worcester, Mass.

Write for full
particulars



**Why Freeze Yourself?
Ruin Your Auto?**

**The Superior
Safe Garage Heater**

SAFE. NO FUMES.
NO GASES

Equipped with pilot light. No
matches, no danger, no discomfort.
An ideal positive heater.

SUPERIOR MANUFACTURING CO.

N. S. Pittsburgh, Pa.

BRAENDER TIRES & TUBES



Are of the highest quality and the cheapest on
mileage. They are built to last. Send for price
list and particulars.

BRAENDER RUBBER & TIRE CO.
Main Offices and Factory, RUTHERFORD, N. J.

HARRIS
TRADE MARK REG. U.S. PAT. OFF.
OILS
AND
GREASES

326 S. Water St. Providence, R. I.
Branch: 143 No. Wabash Ave., Chicago, Ill.

The Easiest Riding
Car in the
World

MARMON
F. E. WING
562 Commonwealth Ave.
BOSTON, MASS.

New England Dealer for

NORDYKE & MARMON CO., Indianapolis, Ind.

MARMON "41"
\$3250

132" Wheelbase

MARMON "48"
\$5000

145" Wheelbase

PAIGE "36"—\$1195
"25"—\$ 925

Leaders of popular-priced cars—thoroughly built, completely
equipped, backed by a strong organization. Specifications and cat-
alog on request.

PAIGE-DETROIT MOTOR CAR CO.
Detroit, Michigan

(When Writing to Advertisers, Please Mention The Automobile Journal.)



NEW DOVER GARAGE SOAP ECONOMIZER

Reduces Soap Consumption Over One-Half
Saves all Waste
Prevents Theft

SEND FOR 1914 CATALOGUE

(2) Dover Stamping & Mfg. Co., Cambridge, Mass.

F. SHIRLEY BOYD

175 Massachusetts Ave., Boston, Mass.

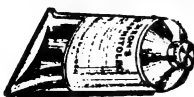
R. I. V. Ball Bearings.

Baldwin Chains and Sprockets.

J. H. Sager Line.

DIXON'S Graphitoleo

There's a new booklet descriptive of this and other members of the Dixon Graphite Automobile Lubricant family. It's number is 210-H. Write for it.



Made in Jersey City, N. J., by the
JOSEPH DIXON CRUCIBLE COMPANY

Mea
MAGNETOS



Sole Importers

MARBURG BROS., 1790 Broadway, NEW YORK

S. R. O.
BALL BEARINGS



BALL BEARINGS REGROUND

at one-fifth the cost of new, also New Single Row Annular, Thrust, New Departure Double Row and Radax Bearings.

AHLBERG BEARING CO.

Boston Chicago Detroit
New York Los Angeles Cleveland

VALVOLINE OIL CO.

Heavy, Medium and Light

Automobile Oils

27 STATE STREET BOSTON, MASS

What Tires Best Protect the Dealer on His Road to Success?



The best tire for the sales room is the one that is best on the road plus a factory policy

that does not pit one dealer against another—that gives you *all* the Miller business in your territory.

The Miller tire answers every tire question on the road because these questions are scientifically answered in the Miller factories first.

Tire users are demanding this tire that has not had its natural wax and oil cooked out of the cotton fibre—they are demanding this tire with long-lived, geared-to-the-road tread.

They are demanding and they are buying Miller tires.



Do You Want Their Business ?

If so, write us at once.

THE MILLER RUBBER CO.

AKRON, Ohio, U. S. A.



Miller red inner tubes are made from pure gum, heavy and strong, yet so exceptionally elastic that they do not lose their shape.



(When Writing to Advertisers, Please Mention The Automobile Journal.)



"Don't Gamble With Safety!"

S-M-C Brake Lining Insures Against Accident

Passenger Safety, Personal and Property Damage Depend Entirely Upon Brake Efficiency. Absolutely Efficient Brakes Are Always Necessary.

With S-M-C Lining any owner can be certain of his brakes and have positive control of his car.

S-M-C quality is the best that science and highest grade material can produce. Measured by service it is the cheapest brake lining you can buy.



It is made in all widths and thicknesses and is sold by your dealer with a guarantee of satisfaction, no matter what the service or conditions of use.

NEW UNIVERSAL Ford Transmission Lining

A special quality for lining transmission bands, that has extreme endurance and obviates all transmission troubles. Sold with rivets, ready for installation. A special price will be given the trade and Ford owners for the next 30 days. Write today.

"SOMETHING MOR'N COTTON."

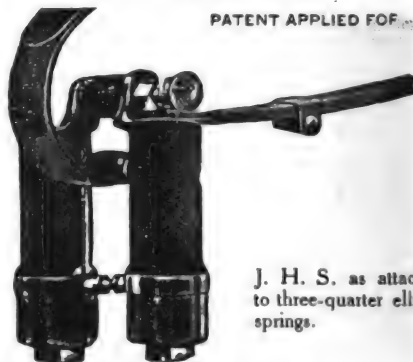
STAYBESTOS MFG. CO.

Germantown, Philadelphia, Pa.

Makers of
Asbestos and Rubber Packings, Gaskets and Radiator Hose

J. H. S.

PATENT APPLIED FOR



J. H. S. as attached to three-quarter elliptic springs.

Backed by ten years of success in the manufacture of shock absorbers.

**Indispensable for Comfort
and Economy of Upkeep**

Price \$25.00—ANY CAR

30 Days' Free Trial—Year Guarantee

J. H. SAGER CO., 271 South Ave., Rochester, N. Y.

New England Distributor

F. SHIRLEY BOYD, 175 Massachusetts Ave., Boston, Mass.

Write today for
our Territorial Agree-
ment on the New

\$1,000

Inter-State "FOUR"

The ONE popular priced car with
the greatest selling arguments
in the country

INTER-STATE MOTOR CO.
804 W. Willard St.,
MUNCIE, IND.

Why Pay Excessive Hotel Rates?

THE NEW AMSTERDAM

Euclid Avenue at 22nd Street, CLEVELAND, OHIO

A five minutes walk from the active centres, yet overlooking the most beautiful residence section of Cleveland.

"The logical resting place for tired Tourists."

Large airy suites of from two to five rooms (also single rooms.)

GARAGE NEARBY

**RATES:—\$1.50 per day, each person
Dining Room Modified a la Carte**

A. A. McCASLIN, Managing Director

L. McNAMARA, Manager

When Writing to Advertisers, Please Mention The Automobile Journal.

Meet me at the
Tuller



For Value,
Service, Home
Comforts

New HOTEL TULLER

Detroit, Michigan

Center of business on Grand Circus Park. Take Woodward car
get off at Adams Avenue.

ABSOLUTELY FIREPROOF

200 Rooms, Private Bath, \$1.50	Single, \$2 50	Up, Double
200 " " " 2.00	" " " 3.00	" " "
100 " " " 2.50	" " " 4.00	" " "
100 " " " 3.00 to 5.00	" " " 4.50	" " "

Total 600 Outside Rooms. All Absolutely Quiet.
Two Floors—Agents' New Unique Cafes and
Sample Rooms Cabaret Excellent



SPEDOLENE solves the problem of automobile
and motor truck gear lubrication. One trial
is all we ask. "A fair field and no favor"
will demonstrate to your satisfaction that
SPEDOLENE is the King of all lubricants for
gears.

Henry H. Kroh, Boston Distributor.
MANUFACTURED BY
Continental Asbestos Corporation, Worcester, Mass

MOTOR PARTS COMPANY

OFFICIAL
BOSCH DISTRIBUTOR

Zenith Carburetor Mohawk Tires Leak-Proof Rings

185-187 Columbus Avenue, BOSTON
818 No. Broad St., PHILADELPHIA SPRINGFIELD, MASS.

Peerless Quality in Smaller Size

"ALL PURPOSE" FOUR AND SIX
FOUR AT \$2,000 (Sixes \$250 Extra)

THE PEERLESS MOTOR CAR CO., CLEVELAND, OHIO

Makers also of the "48-Six" and Peerless Trucks.
Licensed under The Kardo Patents.

\$485 Salvador Car \$485

Four-Cylinder, Water-Cooled Unit Power Plant
with Three Speed Selective Transmission and Shaft
Drive. The Quality and Equipment of the High-
Priced Car at Cyclecar Price.

SALVADOR MOTOR CO., 126 Massachusetts Avenue
Boston, Mass.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

It PLUGS The Hole and It HUGS The Hole Sampson Puncture Plug



For Automobile Inner Tubes. Quickly and
permanently repairs the Puncture. Cuts down
the cost of repair to a minimum. No cumber
some tools or heating irons necessary—only one
small tool and your bare hands.

This cross section view of the working of the SAMPSON
REPAIR PLUG shows how thoroughly the tube may be repaired
in a few seconds and the way the edge of the plug presses against the
shoe, LEAVING NO LUMP.



The strong, metallic disks are covered with rubber of the finest
quality. The rubber jacket extends beyond the edge of each disk,
as here shown.

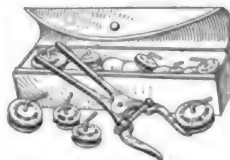
When the two disks are brought together by a wire thumb-screw,
which is then broken off, the pressure of rubber against rubber—of
the two halves of the plug against the rubber of the tube—makes a
complete and permanent repair. This method of drawing the two
sections of the plug together making a tight joint with the tube is
good tire practice, and universally used by every manufacturer to
fasten the valve stem to the inner tube. Good for 30,000 miles if
the tube itself holds out.

Positively cannot leak, chafe or wear—will outlast the tube.

No Cement No Cleaning No Waiting

A two minute roadside repair as permanent as vulcanizing

Booklet
Mailed
Free on
Application

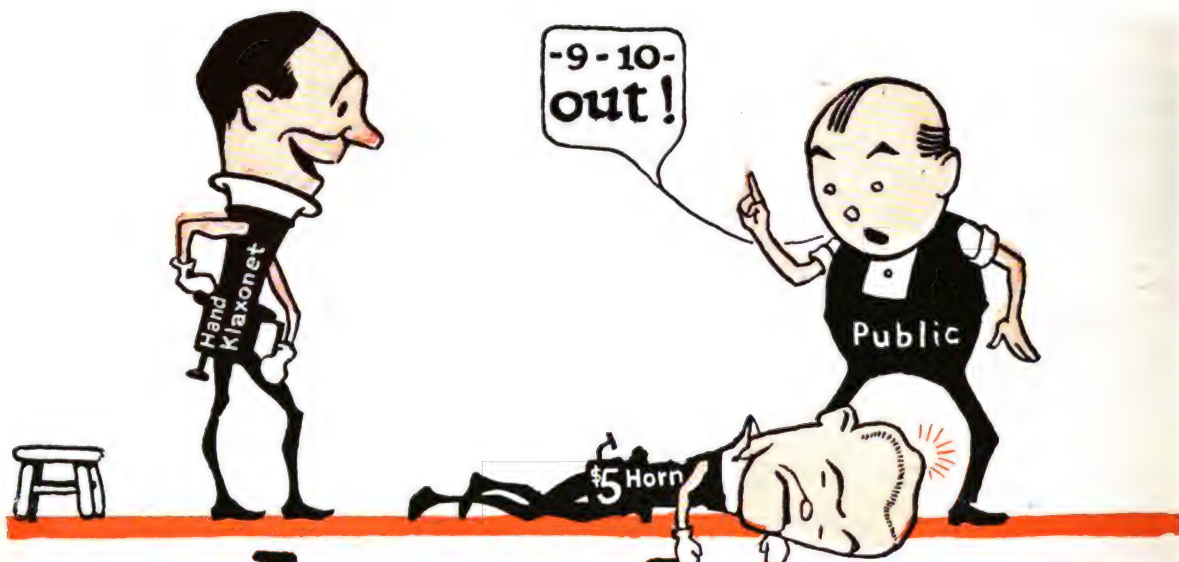


Dealers
Stock up
for the
season's
demands

PRICES:—No. 1, Sampson Repair Kit, Containing 1 Tool and 1 Doz. Assorted
Plugs, \$2 50. No. 2, Sampson Carton Kit, Containing 1 Tool and 1-2 Doz.
Assorted Plugs, \$1.50.

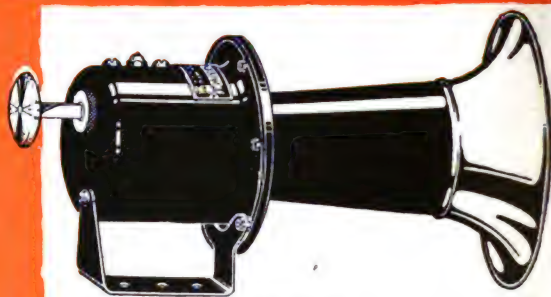
STEVENS & COMPANY, 375 Broadway, New York





a knockout!

\$4



The Hand Klaxonet

Operates on an entirely new principle. The short-stroke plunger produces a long, loud note. The slightest touch gets immediate response—never catches nor sticks. Projector is brass (not steel); bell is oval, not round. Klaxon quality is built into it; Klaxon reputation is behind it; guaranteed *permanently*.

Deliveries May 1st.

LOVELL McCONNELL Mfg. COMPANY



(When Writing to Advertisers, Please Mention The Automobile Journal.)

PIERCE- ARROW

The mind of the owner of a Pierce-Arrow does not run on ahead of him in vain speculation as to whether the car will be on time, or will get him there on time. He soon sinks into a feeling of trustfulness in regard to his Pierce-Arrow. He need never interrupt his plans, break an engagement, allow greater time for going to and fro, or omit doing anything that counts upon the faithful efficiency of a Pierce-Arrow.

THE PIERCE-ARROW MOTOR CAR CO
BUFFALO NEW YORK



An Outward Expression of Inward Worth

Honesty and sincerity are woven into the very warp and woof of MULTIBESTOS Brake Lining. In making it complete in our own factory we are mindful of the important work it has to do when finished and in actual use.

To us it is serious business—this manufacturing of an article upon which the safety of thousands of our fellow men depends.

It is so easy to be mislead in the purchase of brake lining; so many have the same outward appearance, that we are now marking MULTIBESTOS with "White Foot Prints", or plain white lines which run across the fabric at intervals of exactly one foot.

Not only do these "White Foot Prints", protect MULTIBESTOS users; they also afford a great saving of time and inconvenience to the men in the trade who are handling it, for the marks are spaced exactly and can be used for measurement.

So, look for the "White Foot Prints"—the outward expression of true worth in brake lining.

Standard Woven Fabric Company

FRAMINGHAM, MASSACHUSETTS

SALES BRANCHES

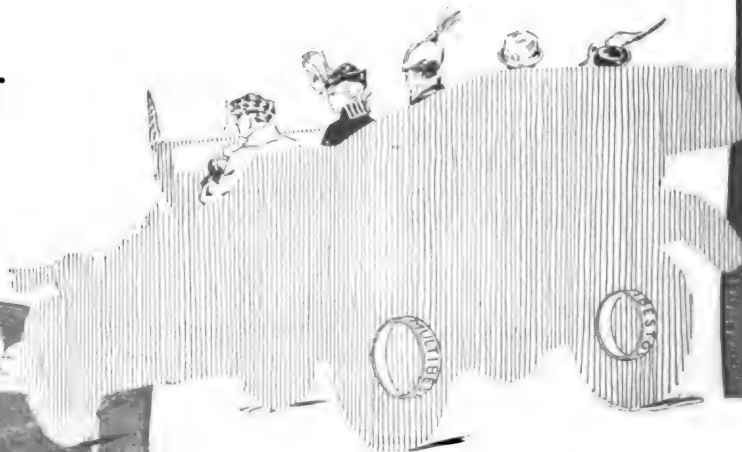
BOSTON—903 Boylston Street, F. S. Boyd

PHILADELPHIA—1309 Race Street, N. A. Petry Co., Inc.

CHICAGO—1430 Michigan Boulevard, F. W. Sparks

SAN FRANCISCO—Cor. First and Howard Streets, Fred Ward & Son

Safe
in the Grip of
Multibestos



AUTOMOBILE JOURNAL

\$1.50 the year
10 cents the copy

PAWTUCKET R.I.

April 10, 1915

DANGER PENNIES

*How false economy in lubrication
often proves a boomerang*

LET us look at some plain arithmetic.
Suppose your car cost \$1,200.

At the end of the year, you reckon expenses and, roughly, you find:

Depreciation in selling value, say	\$400.
Tires, approximately	100.
Repairs	?
Gasoline, 5000 miles at 1c. a mile	50.
Insurance, say	65.
Lubrication, perhaps as much as	10.
	\$625. plus

Lubrication comes last—at a trivial \$10 a year.

It is a human failing to treat such small outlays lightly.

Some motorists do not yet realize that oils which can be sold at pared-down prices cause pared-down efficiency, and send total yearly expenses up—not by mere penny steps but by real dollar leaps.

Consider *depreciation*. Why does it loom up so large?

Not enough attention to that \$10 a year. When all cars are given efficient oil for their motors, automobiles will command higher resale prices.

Trace back most *repair bills* and again you find *not enough attention to that \$10 a year.*

Gasoline consumption mounts up. The experienced motorist knows that efficient lubrication insures a higher mileage from gasoline.

This is certain: Cheap, poor-wearing oils make noisy, quick-wearing motors.

And worn motors soon wear out.

If you decide in favor of **true** economy in lubrication, you will find your scientific guide in our Chart of Automobile Recommendations which represents our professional advice.

A complete chart will be sent you on request



Mobil oils

A grade for each type of motor

*In buying Gargoyle Mobil oils from your dealer, it is safest to purchase in original packages.
Look for the red Gargoyle on the container.*

The four grades of Gargoyle Mobil oils, for gasoline motor lubrication, purified to remove free carbon are:

Gargoyle Mobil oil "A"
Gargoyle Mobil oil "B"

Gargoyle Mobil oil "E"
Gargoyle Mobil oil "Arctic"

For information, kindly address any inquiry to our nearest office.

VACUUM OIL COMPANY, Rochester, N. Y., U. S. A.

Specialists in the manufacture of high-grade lubricants for every class of machinery. Obtainable everywhere in the world

DOMESTIC BRANCHES:

DETROIT BOSTON NEW YORK CHICAGO PHILADELPHIA INDIANAPOLIS MINNEAPOLIS PITTSBURGH
Ford Bldg. 49 Federal St. 61 Broadway Fischer Building 4th & Chestnut Sts. Indiana Pythian Bldg. Plymouth Bldg. Fulton Bldg.

What's the Answer to the Mileage Question?



But They Can't Answer Your Mileage Question Unless They're On Your Car.

SOME men try to answer this question by buying tires at a price. How can they get mileage out of a tire that price prohibits the builder putting it to it? Others endeavor to answer it by dickering for adjustments—and that is all they get. Others accept the factory equipment tires on their cars as the solution to the mileage question. But the car builder neither makes nor guarantees tires

This mileage question is never settled until it is answered right. You can only get as many miles out of a tire as the manufacturer puts into it.

Miller Builds Mileage In For You.

by first making a shock-resisting back bone of cotton fabric. And do you know that fabric is just as important as rubber in a tire? In fact, while rubber is necessary for resiliency, its greater function is to protect the fabric. The Miller method, which gives you the right rubber compound (and plenty of it) goes farther. It produces the right kind of fabric and that's what makes Miller Tires go farther!

The Miller Method is an exclusive process of vulcanizing with a low degree of heat—applied for a short time. It retains the natural wax and oil in the cotton fibre, and thus prevents internal friction, because it leaves nature's lubricant in the minute strands and fibre of the cotton.

This wax and oil carbonize at 240 degrees, but the old method requires 287 degrees to vulcanize the tire. A brittle and lifeless fabric cannot stand the terrific punishment that all tires must endure.

The process by which Miller tires are built, thoroughly vulcanizes, makes a perfect unit of rubber and fabric, without burning the life out of either, and with no point of cleavage in the construction.

This method of vulcanization—the retention of the vegetable wax and oil—means life in the fabric and rubber. It results in safety—freedom from blow-outs, and additional miles of wear in Miller tires, as thousands and thousands of motorists have found out.

Settle this mileage question today by going to the Miller dealer. When he puts Miller tires on your car, you can put the mileage question out of your mind for good.

**The Miller Rubber Co.,
AKRON, U. S. A.**

Distributors in Your Own Field

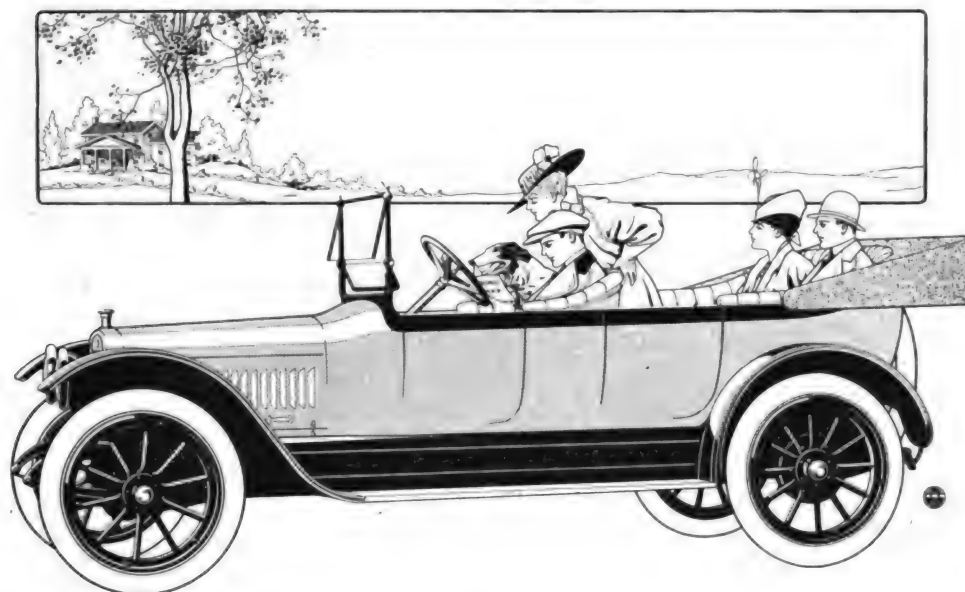
**WAX AND OIL
IN THE COTTON
MEAN MILES
ON THE ROAD**

The answer to the skid question is Miller Geared-to-the-road Tires! They gear your car to the road, through mud, sand or slush. With Miller tires on your car you're in control. Its tread is an integral part of the tire and retains its safety features until the entire tire is worn out. The greater mileage you get from them will make your choice of Miller Tires an economy, as well as a permanent safeguard.

**MILLER
TUBES**

answer
the tube
question.

WINTON SIX



First In New Field

The Winton Company is again first in a new field. We were first to market an American built motor car, first to make self-starting motors, first to build sixes **exclusively**. Now we are first to put palatial excellence into a car of happy-medium size, and first to sell a car of highest quality at a price below \$3000. The New-Size Winton Six is without a competitor. You can have your personal car finished in your own color scheme.

Price \$2285. 3 5-8 by 5 1-4 six-cylinder motor. 128 inch wheel base. Write today for complete catalog.

The Winton Motor Car Co.

131 Berea Road

Cleveland, Ohio

(When Writing to Advertisers, Please Mention The Automobile Journal.)



**Wrenches Are Made Right, Stay Right,
Last a Lifetime, and are 30% Stronger
Than Any Other.**

**"COES" on any Wrench Means Quality,
Best Material and Finest Workmanship.
An Inspected and Tested Wrench. The
Ironclad "COES" Guarantee for Strength
and Finish.**

**The "COES" Automobile Model are for Motorists
and Repairmen. For Service Specify "COES" No
Tool Kit or Repairshop is Complete Without One.**

**Ease of Handling Without Fear of Slipping or Bruis-
ing. Perfect Balance and Certain Grip has made the
"COES" the Most Widely Used Tool of the Kind in
the World.**

COES WRENCH CO.

WORCESTER MASS.

J.C. McCARTY & CO.
JOHN H. GRAHAM & CO.

29 Murray St. New York City
113 Chambers St. New York City

When Writing to Advertisers, Please Mention The Automobile Journal.



National

Six—The Descendant of Champions

THE same spirit of fitness that prompts those who love the finest of pedigreed horses and dogs, directs their selection of *National* cars.

The *National* shows its superiority and class by its appearance and performance. Its blue-blooded strain is apparent even tho you may not be familiar with its history of successes. This new *National* Six is not of nondescript ancestry, but is the lineal descendant of the World's Stock Car Champion, and of the International 500-

mile race record holder for "Made in the U. S. A." cars, on the Indianapolis Speedway.

The *National* has always been a leader—not waiting until forced to follow the example of others, but preceding others with higher standards of efficiency, beauty and comfort in advance of the recurring season. *National* Sixes \$2375.

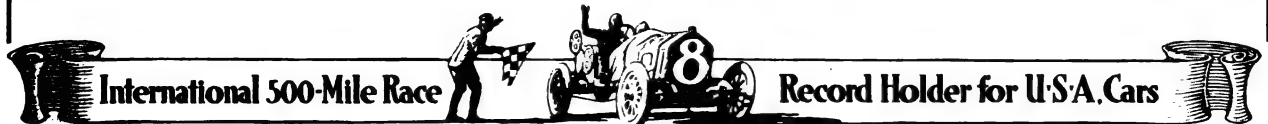
Seven distinct new styles—roadsters or touring cars with divided front seats and disappearing auxiliary seats. Special bodies up to \$2850, including Coupe, Cabriolet and Parlor Car with individual adjustable arm chairs. *National* Sixes develop any part of 55 h. p. at a fuel efficiency up to 17 miles per gallon.

National Motor Vehicle Company, Indianapolis

A. T. HART CO., 1020 Boylston Street, Boston, Mass.

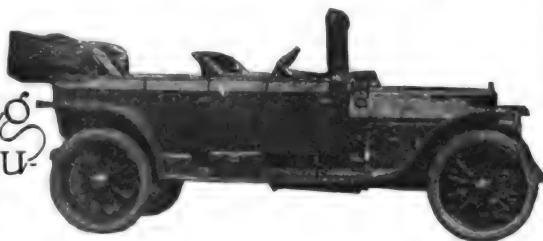
J. C. TUCKER, 272 W. Exchange Street, Providence, R. I.

W. C. WIGGINS, 1147 Main Street, Worcester, Mass.



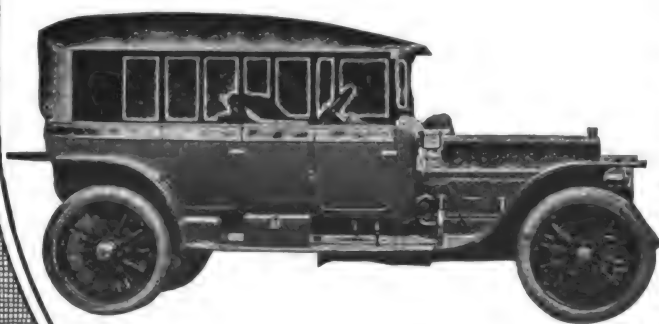
(When Writing to Advertisers, Please Mention The Automobile Journal.)

The comfort of every car body combined. An instantaneously convertible equipment that affords a touring body or a limousine whenever desired.



Changes can be made on the road as readily as in the garage. No matter what the occasion or requirement, your car with the

SPRINGFIELD CONVERTIBLE BODY is always ready and always has



the accommodation and protection you desire.

Can be raised or low-

ered as easily as folding top.

SPRINGFIELD METAL BODY CO.

SPRINGFIELD

MASS.

Index to Advertisers.

	Page		Page
Ahloerg Bearing Co.....	74	Reflex Ignition Co.....	70
Alsten & Goulding Co.....	75	Royal Equipment Co.....	73
Barrett Manufacturing Co.....	65	Scripps-Booth Co., The.....	77
Bosch Magneto Co.....	71	Splitdorf Electrical Co.....	70
Boyd, F. Shirley.....	74	Springfield Body Co.....	4
Braender Rubber & Tire Co.....	75	Standard Oil Co.....	73
Coes Wrench Co.....	2	Staybestos Mfg. Co., The.....	71
Continental Asbestos Corp.....	72	Stutz Motor Car Co.....	5
Culver Stearns Mfg. Co.....	73	Superior Mfg. Co.....	71
Dixon Crucible Co., Jos.....	74	Texas Oil Co., The.....	72
Dover Stamping & Mfg. Co.....	74	Tuller Hotel.....	72
Eagle Oil & Supply Co.....	5	Thermoid Rubber Co.....	69
Elsemann Magneto Co.....	76	Times Square Automobile Co.,	5
Garford Mfg. Co.....	76	Vacuum Oil.....	Cover
Goodyear Tire & Rubber Co.,	9	Valvoline Oil Co.....	74
Harris Oil Co., A. W.....	75	Vanderpool Company, The.....	5
Heinze Electric Co.....	73	Weed Chain Tire Grip Co.....	75
Hotel New Amsterdam.....	78	Willys-Overland.....	12
Hotel Tuller.....	72	Winton Motor Car Co.....	1
Indian Refining Co.....	69	Zenith Carburetor Co.....	Cover
Inter-State Motor Co.....	69		
Jeffery Motor Car Co.....	10		
LoveH-McConnell Mfg. Co.....	80		
McQuay-Norris Mfg. Co.....	70		
Marburg Bros.....	74		
Mayo Mfg. Co.....	11		
Mea Magneto Co.....	74		
Metz Company.....	76		
Miller Rubber Co.....	Cover		
Milwaukee Auto Specialty Co.,	78		
Mossberg Co., Frank.....	61		
Motor Parts Co.....	72		
National Motor Veh. Co.....	3		
New Amsterdam Hotel.....	78		
New Departure Mfg. Co.....	Cover		
Nordyke & Marmon.....	71		
N. Y. & N. J. Lubricant Co.....	78		
Oxygen Generator Co.....	79		
Paige Detroit Motor Car Co.,	69		
Peerless Motor Car Co.....	72		
Pyrene Co. of N. E.....	78		

WANTED:

Experienced Storage Battery Salesman to solicit local trade. Write giving full details, also salary. Storage Batteries, care Automobile Journal Publishing Company, Pawtucket, R. I.

FOR SALE.

Shop Vulcanizer, Bargain. Vanderpool, Springfield, O.

We sell everything pertaining to the automobile at half regular prices. Send for our great "PRICE WRECKER" No. 5, containing 3000 auto bargains at cut prices. TIMES SQUARE AUTOMOBILE Co. World's largest dealers. S. W. Cor. 56th St. and Broadway, N. Y. 1210 Michigan Avenue, Chicago.

IMITATED

BUT NOT
DUPLICATED

N
O
K
A
R
B
O
N

E
A
G
L
E
I
N
E

A
U
T
O
O
I
L

THE OIL THAT SUITS
AND DOES NOT SOOT.

Carbon in your cylinders means loss of power. Customers report 10,000 to 15,000 miles with no carbon troubles. A good motto: TRY ANYTHING ONCE. EAGLEINE NO-KARBON AUTO OIL is furnished in 1-5-10 gallon, 30 and 50 gallon Steel Drums with faucets for which no extra charge is made.

EAGLE OIL
AND SUPPLY CO.

104 BROAD STREET. BOSTON, MASS.



OFFICIAL ROAD RACE CHAMPION

The success of Stutz racing cars in contests means greater power and stronger parts in the vital places guaranteeing longer life and better service on the road. Write for literature.

STUTZ MOTOR CAR COMPANY, INDIANAPOLIS

Buyers' Reference and Guide.

ACCESSORY MANUFACTURERS AND JOBBERS.

Alsten & Goulding Co., Worcester, Mass.

Auto Parts Co., Providence, R. I.
Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.

Times Square Auto Co., 56th St., at Broadway, New York City.

AIR COMPRESSORS AND TANKS.

Brunner Mfg. Co., Main Office and Factory, Utica, N. Y.; New York Office, Hudson Terminal Bldg., 30 Church St. (Brunner.)

Williams Foundry & Machine Co., Akron, O.

ANTI-RATTLERS.

King Specialty Co., Brookline, Mass.

ARBOR PRESSES.

Bartlett, Edwin E., 322 A St., Boston. (Greenerd.)

AUTOMOBILES. (See Cars.)

AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

Motor Specialties Co., Waltham, Mass.

BALLS AND BALL BEARINGS.

Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1790 Broadway, New York City; 805 Woodward Ave., Detroit.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (R. I. V.)

Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)

New Departure Mfg. Co., Bristol, Conn. (New Departure.)

Norma Co. of America, 1790 Broadway, New York City. (Norma.)

BEARING METALS.

Bunting Bronze and Brass Co., 727 Spencer St., Toledo, O. (Bunting.)

BODIES—WOOD AND METAL.

Highland Body Mfg. Co., Cincinnati, O. (Highland.)

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

BRAKE BANDING OR LINING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Multibestos.)

Royal Equipment Co., 1378 Bostwick Ave., Bridgeport, Conn. (Raybestos.)

Standard Woven Fabric Co., Framingham, Mass. (Multibestos.)

Staybestos Mfg. Co., Lena and Armat Sts., Germantown, Philadelphia, Penn. (Staybestos.)

Thermoid Rubber Co., Trenton, N. J.

BRUSHES, WIRE.

Williams Foundry & Machine Co., Akron, O.

CABLE, AUTOMOBILE.

Packard Electric Co., The, Warren, O.

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARBURETORS.

Air-Friction Carburetor Co., Dayton, O. (Model C.)

Findelsen & Kropf Mfg. Co., 2127 Rockwell St., Chicago. (Rayfield.)

Zenith Carburetor Co., Detroit. (Zenith.)

CARS—GASOLINE PLEASURE.

Inter-State Motor Co., 804 West Willard St., Muncie, Ind. (Inter-State.)

Metz Co., Waltham, Mass. (Metz.)

Nordyke & Marmon Co., Indianapolis. (Marmon.)

Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Salvador Motor Co., Farragut Bldg., Massachusetts Ave., Boston. (Salvador.)

Scripps-Booth Co., Detroit. (Scripps-Booth.)

Studebaker Corp., Detroit, Mich. (Studebaker.)

Stutz Motor Car Co., Indianapolis. (Stutz.)

White Co., Cleveland, O. (White.)

Willis-Overland Co., Toledo, O. (Overland.)

Winton Motor Car Co., 131 Berea Road, Cleveland, O. (Winton.)

CARS—GASOLINE COMMERCIAL.

Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)

Chase Motor Truck Co., 106 West St., Syracuse, N. Y.

Duplex Power Car Co., Charlotte, Mich. (Duplex.)

Federal Motor Truck Co., Junction and Leavitt Sts., Detroit. (Federal.)

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

Independent Motors Co., Port Huron, Mich. (Independent.)

Lauth-Juergens Motor Car Co., Fremont, O. (Fremont-Mails.)

Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Sanford Motor Truck Co., Syracuse, N. Y. (Sanford.)

Signal Motor Truck Co., Detroit. (Signal.)

Studebaker Corp., Detroit, Mich. (Studebaker.)

Sullivan Motor Car Co., Rochester, N. Y. (Sullivan.)

White Co., Cleveland, O. (White.)

CARS—ELECTRIC COMMERCIAL.

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

CEMENTS.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y. (Sta-Fix Radiator Mend.)

CHAIN LUBRICANTS.

Motor Accessories Inc., 749 A Boylston St., Boston. (Chain-Lub.)

CHAINS, TIRE AND ANTI-SKID-DING DEVICES.

Weed Chain Tire Grip Co., 28 Moore St., New York. (Weed.)

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

CIGAR LIGHTERS. (See Lighters.)

COILS.

Heinze Electric Co., Lowell, Mass.

CONTROLLERS.

Pierce Speed Controller Co., Anderson, Ind.

CRANK HOLDERS.

King Specialty Co., Brookline, Mass. (King.)

CYLINDER CLEANING COMPOUND.

Bowling Green Sales Co., 42 Broadway, New York City.

Dyer Apparatus Co., Cambridge, Mass. (Oxy-Carbon.)

DRESSINGS, TOP AND LEATHER.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

ELECTRIC LIGHTING EQUIPMENT.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FAN BELTS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

FIRE EXTINGUISHERS.

Pyrene Co. of N. E., 88 Broad St., Boston.

FORD AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

FORD STARTERS.

Hunter Auto Supply Co., Hunter Bldg., 333 W. Madison St., Chicago, Ill. (Hunter.)

FUNNELS, AUTO.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind. (Ross.)

GENERATORS.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Oxygen Generator Co., 301 River St., Troy, N. Y.

HEADLIGHT DIMMERS.

Chaney Co., L. F., Springfield, O. (Chaney.)

HEATERS.

Superior Mfg. Co., N. S. Pittsburg, Penn. (Superior Safe Garage.)

HORNS.

Garford Mfg. Co., Elyria, O. (Tuto.)

Lovell McConnell Mfg. Co., Newark, N. J. (Klaxon.)

INSULATION.

Packard Electric Co., The, Warren, O.

JACKS.

Motor Specialties Co., Waltham, Mass. (Excel Auto.)

LAMPS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric Trouble.)

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Clamp.)

LEATHER GOODS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

LIGHTERS, CIGAR.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)

BUYERS' REFERENCE and GUIDE—Continued.**LIGHTING SYSTEMS, ELECTRIC.**

Carleton Co., The 172 Summer St., Boston. (New Carleton No. 68.)
Garford Mfg. Co., Elyria, O. (Dyna-lux.)
Malton Specialty Co., 775 Boylston St., Boston, Mass.

LUBRICANTS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)
Continental Asbestos Corp., Worcester, Mass. (Spedolene.)
Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)
Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagleline No-Karbon.)
Harris Oil Co., A. W., 326 So. Water St., Providence, R. I.; 143 No. Wabash Ave., Chicago. (Harris.)
New York Lubricating Oil Co., 116 Broad St., New York City. (Monogram.)
New York & New Jersey Lubricant Co., 165 Broadway, New York. (MotoRol, Non-Fluid, Kejex.)
Standard Oil Co., New York. (Polarine.)
Texas Company, 17 Battery Place, New York City. (Texaco.)
Vacuum Oil Co., Rochester, N. Y. (Gargoyle Mobiloil.)
Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETO COVERS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.
MAGNETOS AND SUPPLIES.
Boach Magneto Co., 223-225 W. 46th St., New York.
Elsemann Magneto Co., 32 33d St., Brooklyn, N. Y. (Elsemann.)
Helm Electric Co., Lowell, Mass. (Heco.)
Marburg Bros., 1790 Broadway, New York. (Mea.)
Spiltdorf Electrical Co., 98 Warren St., Newark, N. J.

MAILING LIST.

Trade Circular Addressing Co., 166 W. Adams St., Chicago.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

MOTORS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Michigan.)
Wisconsin Motor Mfg. Co., Milwaukee, Wis.

MOTOR STARTERS.

Automatic Appliance Co., 172 Columbus Ave., Boston. (Boston.)

PATCHES, TIRE.

Braender Rubber & Tire Co., Ruth-erford, N. J. (Cementless.)

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

POLISH.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

PRESSES. (See Arbor Presses.)**PUMPS, TIRE.**

Kellogg Mfg. Co., Rochester, N. Y. (Kellogg.)

PUMPS, VALVE.

Hill Pump Valve Co., Chicago, Ill.
RADIATOR CEMENT. (See Ce-ments.)
REAMERS.

Harding Distributing Co., Boston. (Martell Aligning.)

RINGS. (See Piston Rings.)

ROAD BUILDING MATERIALS.
Barrett Manufacturing Co., New York. (Tarvia.)

ROLLER BEARINGS.

Hyatt Roller Bearing Co., Detroit. (Hyatt.)
Norma Co. of America, 1790 Broad-way, New York City. (Norma.)

SEATS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Rac-ing.)

SEAT COVERS.

Perkins-Campbell Co., 622 Broad-way, Cincinnati, O.

SELF-STARTERS. (See Motor Starters.)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Sager Peerless.)
Oxygen Generator Co., 301 River St., Troy, N. Y.
Perkins-Campbell Co., 622 Broad-way, Cincinnati, O.

SPARK PLUG CASES.

Perkins-Campbell Co., 622 Broad-way, Cincinnati, O.

SPARK PLUGS AND IGNITERS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)
Boach Magneto Co., 223-225 W. 46th St., New York.
Helm Electric Co., Lowell, Mass. (Heco Priming.)
Milwaukee Auto Specialty Co., 705-711 Chestnut St., Milwaukee, Wis. (Centerfire.)
Silvex Co., The, 171 Madison Ave., New York, N. Y.
Spiltdorf Electrical Co., 98 Warren St., Newark, N. J.
Stonebridge Sales Co., 10 Wall St., New York, N. Y.

SPRINGS FOR AUTOMOBILE SUS-PENSION.
Marburg Bros., Inc., 1790 Broad-way, New York. (Marburg-Hagen.)
Tuthill Spring Co., 776 Polk St., Chi-cago. (Titanic Unbreakable.)

SPROCKETS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

TEST CLIPS.

Mueller & Co. R. S., 431 High Ave., S. E., Cleveland, O. (Universal.)

THERMO CASES.

Dover Stamping & Manufacturing Co., Cambridge, Mass.

TIMERS.

Motor Specialties Co., Waltham, Mass. (Bemus.)

TIME STAMPS.

Hoggson & Co., S. H., Thames Bldg., New York, N. Y.

TIRE ACCESSORIES.

Braender Rubber & Tire Co., Ruth-erford, N. J.
Stevens Mfg. & Supply Co., Fisher Bldg., Chicago. (Stevens Valves.)
TIRE CHAIN GRIPS. (See Chains.)
TIRE PRESERVATIVES AND PRO-TECTORS.

Braender Rubber & Tire Co., Ruth-erford, N. J.

TIRE REPAIR EQUIPMENT.

Stevens & Co., 373 Broadway, New York City. (Sampson Inner Tube Plug and Outfits.)

TIRES, CASINGS AND INNER TUBES.

Braender Rubber & Tire Co., Ruth-erford, N. J. (Braender.)
Federal Rubber Mfg. Co., Milwau-kee, Wis. (Federal.)
Goodyear Tire & Rubber Co., Mad-ison St., Akron, O.
Miller Rubber Co., Akron, O. (Mil-ler.)
Polack Tyre & Rubber Co., 246 W. 59th St., New York City. (Polack.)

TOPS AND ATTACHMENTS.

Highland Body Manufacturing Co., Station P, Cincinnati, O. (High-land Coupe.)
Springfield Metal Body Co., 20 Med-ford Ave., Springfield, Mass.

TRANSFORMERS.

Packard Electric Co., The, War-ren, O.

TRUCKS AND TRACTORS. (See Cars, Commercial.)

UNLOADERS.

Gallon Iron Works and Mfg. Co., 116 East Main St., Gallon, O. (Gallon Eclipse Portable.)

VALVE LIFTERS AND RESEAT-ERS.

Paro, H. G., Suite 718-719 Michigan Blvd., Bldg., 30 No. Michigan Blvd., Chicago.

VALVES, TIRE.

Stevens Mfg. & Supply Co., Fisher Bldg., Chicago. (Stevens.)

VALVE TOOLS.

American Valve Tool Co., Stamford, Conn., Box 27.

VARNISHES, ETC.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

VULCANIZERS.

Mabey's Electric & Mfg. Co., Indian-apolis. (Mabey's Electric.)
Vanderpool Co., Springfield, O.
Williams Foundry & Machine Co., Akron, O.

WELDING OUTFITS.

Dyer Apparatus Co., Cambridge, Mass. (Dyer.)
Waterhouse Welding Co., 3 Pelham St., Boston, Mass.

WHEELS, WIRE.

Houk Mfg. Co., 1709 Elmwood Ave., Buffalo, N. Y. (Houk Detachable.)

WRENCHES AND COMBINATION OUTFITS.

Coen Wrench Co., Worcester, Mass.
Lane, Will B., 180 No. Dearborn St., Chicago. (Unique Ratchet.)
Mossberg Co., Frank, Attleboro, Mass.

PUBLISHER'S AND READER'S PAGE.

FORD Car Owners are urged to read the information contained in the Ford car section of this issue, which will be continued as a regular feature of the Automobile Journal. The editor has felt that such a department would appeal to the thousands of readers, and has incorporated into it much valuable information and suggestions specially prepared in relation to the operation, maintenance and repair of Ford cars. Valuable information relative to the most recent and practical accessories, supplies and equipments has also been included. Wishing to make this department of the utmost value to the readers, the editor would welcome any suggestions that would tend to develop the section and the service it is purposed to afford.

The New Owners' Department is inaugurated in this number of the Automobile Journal, according to the announcement contained in the March 25 issue. Because of the enormous increase in production and use of motor cars, and that many thousands of owners are not well versed in mechanical knowledge of their cars, it has been decided that a department devoted entirely to the interest of the owners of new cars would be of special value. In this department the motorist seeking knowledge will find much valuable information, written in easily understandable terms, relative to the operation, upkeep and repair of automobiles, and many hints that will be found invaluable in the garage or upon the road. In another section of each issue of the publication will be found additional suggestions as to repairs of various units of the car that the owner will appreciate. In addition to this published information, the department editor is prepared to answer promptly any personal inquiry that the reader may send to him. Included in this department is a section devoted to the

latest and most practical motor car supplies, equipments and accessories, which are reviewed, illustrated and described in a careful and authentic manner by the department editor.

Touring Data is appropriate at this season of the year, and in an early issue the Automobile Journal will begin its series of touring information, which has always been an unrivalled feature of this publication. The coming issues will contain even more complete and varied information than ever has appeared before. The itineraries will cover practically the whole country, and the data included will be absolutely authentic. As heretofore, every issue will be profusely illustrated, and in addition the reader will be told the "how, when and where" of interesting points for tours in his particular locality. The California expositions are the lodestones for thousands of tourists this year, and in this connection the Touring Department will keep the readers fully informed. At the height of the season the Annual Touring Number will make its appearance, and it will be the largest, most comprehensive and most profusely illustrated of any edition of the kind ever published. Letters of inquiry relating to touring addressed to the Touring Department will be cheerfully and promptly answered.

General Overhauling time is now at hand. The average owner approaches this task in uncertain frame of mind because of his lack of mechanical knowledge. This can be obtained either by experience or by learning from the experience of others. No information available can be compared with the series of mechanical books published by this company. Every subject relating to a car or a truck is treated in a manner easily understood by the novice.

Partia Table of Contents.

	Page
*The Jitney Car Service in New England.....	13
*Motor Repair Shops in War.....	17
*Eight-Cylinder V Type Motors.....	19
*General News of the Industry.....	31
*Practical Motor Car Repairs.....	35
*A. A. A. Has Competition.....	41
*Refinements of Oldsmobile Cars.....	42
*In the Commercial Vehicle Field.....	44
Editorials	48
*Feeding Soldiers from Federal Trucks.....	49
*Car Accessories and Equipment.....	52
*The "G R C" Quick Demountable Rim.....	57
*Suggestions for the New Car Owner.....	59
Industrial Happenings and Comment.....	66
*Practical Facts for Owners of New Cars.....	67
Readers' Queries.....	70

*Indicates article is illustrated.

SUBSCRIPTION BLANK.

AUTOMOBILE JOURNAL PUBLISHING CO.,

Enter Order for the Following Publications:
(Designate by marking X in Space at Left of Titles.)

—The Automobile Journal (Subscription, one year)..... @ \$1.50
—The Motor Truck (Subscription, one year)..... @ \$2.00
—The Accessory and Garage Journal (Subscription, one year)..... @ \$2.00

Make Remittances by Check, Bank Draft, Postoffice or Express Money Order or Stamps. All Money Enclosures Are at SENDER'S RISK.

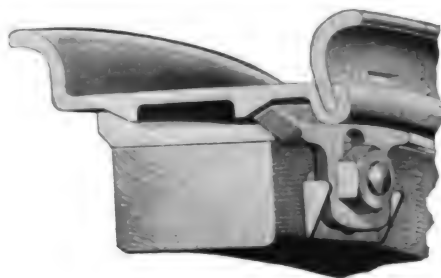
TIMES BUILDING, PAWTUCKET, R. I.

Enter Price for Each
Book Ordered

Name _____

Street _____

City or Town _____ County _____ State _____



Plain Simplicity made Goodyear Rim-Success

Evolution in Rim Design

Constant study and experimenting produced this better Goodyear Rim.

Tires themselves are annoying if they happen to go wrong. But it's the "grief" in changing tires that causes trouble.

Now it's done without hard work by the Goodyear Detachable Demountable Rim.

Goodyear Rims can't stick—won't balk when you want to take them off. And you don't have to "pound them to pieces" when you try to put them on.

They slip off and on as easy as the telling. Simplicity is the key note of Goodyear Rim-Success.

Take the Drudge Out of Tire Replacing

Tires aren't hard to replace when the rim parts are few and fit.

Note these Goodyear points of simplicity—that make easy rim operation.

The detachable side ring makes it possible to remove the tire from the rim without first removing the rim from the wheel. This is impossible with any split type demountable rim.

The Goodyear is a *solid base* rim. It is the lightest demountable rim on the market with the detachable feature. It won't pinch the tube or permit squeaking; it won't allow water and dirt to

penetrate and attack the tube—all common faults of split base rims.

The wide rim base is a very distinctive feature. This gives you extra air space—the effect of a larger tire.

Manufacturers Specify Goodyear

Manufacturers are steadily adopting Goodyear Rims. Price is not a consideration with them where car owner's comfort is at stake. Ease of Goodyear Rim operation has won them for their cars.

Yet the cost to car owners is no more than for rims of lesser worth.

Dealers Make Added Sales

Many car owners are troubled by complicated and poorly designed rims. This means a great deal of change-over rim business.

Push these Goodyear rims. They save in time, in tires, in trouble. They give best satisfaction. They win you a customer—that means his business in the future. They mean attractive profits.

Write for Facts Today

Dealers—write us for our complete proposition. We help you promote sales in count-

less ways—window displays, free signs, free show cases, free "Tire Saver" booklets.

No obligation. Write us today.

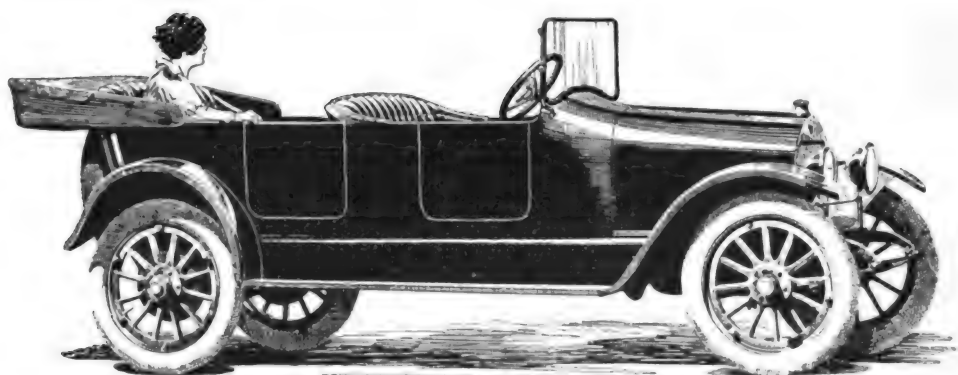
Address Desk 46.

(2190)



THE GOODYEAR TIRE & RUBBER COMPANY, AKRON, OHIO

Makers of Goodyear Automobile Tires.



Pride

Jeffery owners are proud of their cars and of the organization behind them.

They know that the big five million dollar Jeffery plant is the best guarantee they can get of service, economy and continued satisfaction.

Jeffery has never been built to sell on a price basis nor on a quality basis alone. The two have been combined. The Jeffery at medium price gives all the quality of cars of the highest cost.

Jeffery comfort, beauty, workmanship and economy are possible because of the tremendous facilities of the Jeffery organization.

In these important essentials Jeffery leads.

The Thomas B. Jeffery Company
Main Office and Works, Kenosha, Wisconsin

(When Writing to Advertisers, Please Mention The Automobile Journal.)

While the MAYO Pumps the Tire You Take It Easy

No more backache, blistered hands and lame arms, splitting headache, perspiration streaming and a day's pleasure spoiled by working over an out-of-date hand pump.

Enjoy tire pumping! Take 5 minutes of complete relaxation by the roadside with a

\$10
Complete

**MAYO SPARK
PLUG PUMP**

\$10
Complete

The MAYO pumps your tires to **proper pressure** while you rest.

It is guaranteed to pump pure, fresh air only. It inflates a tire faster than any other power pump on the market. Why pay more than \$10 for a pump that won't do any more than a MAYO?

Weight 2 $\frac{1}{2}$ lbs. Fits any tool-box. Handsomely finished in black lacquer.

Instantly substituted for any spark plug. No machine work required—no costly work of installing as with other pumps. Built with metal rings like your motor—and will last as long. Complete, with 12 ft. hose and gauge, \$10. MAYO Q. D. Spark Plug, \$1.50 extra. MAYO Ford Pump, \$8 complete. MAYO Valve Cap Pump, for permanent attachment to motor, \$15.

**Try One Free On Your
Car For 30 Days.**

Dealers Wanted

Mayo Mfg. Co.

66 East 18th Street
Chicago, Illinois



(When Writing to Advertisers, Please Mention The Automobile Journal.)

THE AUTOMOBILE JOURNAL

VOL. XXXIX, No. 5

APRIL 10, 1915

Price, \$1.50 the Year.

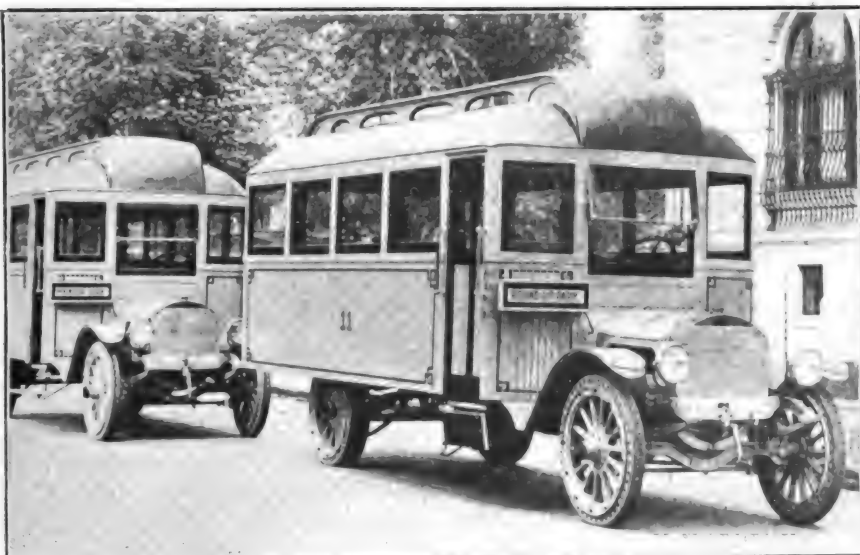
"JITNEY" CAR SERVICE IN NEW ENGLAND.

Outside of Rhode Island, Where 1000 Machines Compete with Trolley Lines, It Is Not Especially Attractive to the Public---Chaotic Conditions That Cannot Continue When Novelty Has Ceased.

OPERATING a "jitney" car may be regarded as a business proposition by those who engage in public transportation, but seemingly even greater incentives than profit have impelled owners of cars to take up what may be regarded as personal competition with the trolley companies of Rhode Island, the largest of which is the Rhode Island Company. New England has been seemingly indifferent to the possibilities of the "jitney" car outside of Rhode Island, but there the people have been quite as extreme in their manifestations of favoritism as the other states have been loath to patronize them.

The preceding issue of the Automobile Journal included an article that was descriptive of the exceedingly favorable conditions that obtained in Rhode Island, and especially in Providence and

Pawtucket, but when one turns to all the other municipalities of New England one must be impressed with the fact that there is practically no material interest in "jitney" car service, and only in one or two cities are there a sufficient number in use to regard them as competitors with existing



Type of Enclosed Motor Omnibus Specially Designed for Use in a Western City for Serving Regular Routes.

transportation facilities.

Portland, Me., folk are willing to take issue with any person who may claim that the first



Adaptation of the English Char-a-Banc Type of Body to a White Truck Chassis for Use in Long and Interurban Service.

"jitney" car in New England was placed in service elsewhere, and in Lynn, Mass., the citizens affirm that the first "jitney" was a motor omnibus that for several years has made regular trips between that city and Revere Beach, the fare being a nickel. But there is one solitary machine in use in Portland, and just now there are six cars in Lynn that are engaged in a fierce competition with a single route of the trolley company.

Worcester, Mass., has perhaps a dozen machines busy in public transportation, and there the owners and drivers have almost reached an agreement of organization, while at Springfield, Mass., there has been rather more activity, for nearly a score of cars are operating. In the cities of Fall River, Brockton and Marlboro, and the town of Westboro, all in Massachusetts, the "jitney" car has appeared, and outside of these municipalities the cities of Hartford, New Haven and Waterbury in Connecticut have been inoculated with "jitneyism" within a few days and a few machines are in service in each. New Hampshire and Vermont have not as yet been reached by the national wave of five-cent motoring.

No section of the country has ever experienced so peculiar a condition as now exists in the smallest state, where with approximately 15,000 pleasure cars registered, nearly 1000 have been licensed to carry passengers, and practically all of them are in service some of

the time. More than 800 machines are licensed in Providence alone, about 150 in Pawtucket, and perhaps a score in Woonsocket, and without considering the other cities and towns of the state, the total stated is very nearly reached.

The situation is peculiar, when one understands that the

population served is not more than 400,000, and the transportation by motor vehicle is confined to the cities. No attempt has as yet been made to afford service in parts of the cities that have no trolley facilities. The purpose of the "jitney" car drivers has been to compete individually with the street railroads, and this means that nearly all the routes now covered by the motor vehicles are those on which the trolley cars are operated.

Favorable to "Jitney" Service.

Conditions have been extremely favorable for the development of the "jitney" service, because in Providence and Pawtucket the local and suburban trolley lines converge in civic centres, and to these the people have been accustomed to go for homeward transportation at least. These locations have been thronged by the "jitney" car drivers, and as they are not required to maintain schedules they have been able to secure passengers in greater numbers than were they compelled to drive back and forth between given terminals that were not so constantly frequented by



GMC Chassis with a Passenger Body Designed for Service in Southern California Between Contiguous Cities.

the people, or off main thoroughfares.

Practically all of the "jitney" car service has been in competition with the electric street cars over given routes, especially during the hours of the day when the travel is heaviest, but at periods of the day when the passengers are comparatively few in number in some sections, the drivers of the "jitney" cars have sought other localities, indifferent to the requirements of those who desired to patronize them, and seemingly regardless of the necessity of the people having transportation that is thoroughly dependable at all times.

Probably the greatest surprise for the people who favored "jitney" car travel was caused by the early April snow storm. Previous to that the weather for nearly two months had been practically without rain, and the streets were in exceptionally good condition. The snow, however, caused a cessation of the "jitney" service when it was most needed, and when it was resumed the cars were driven for 48 hours in the tracks that had been cleared by the despised trolley company.

Another fact impressed upon the people of Rhode Island by experience is that a considerable

number of people from outside the state came to Providence and Pawtucket and engaged in "jitney" service, and that as soon as the increasing number of machines diminished the revenue to be obtained these drivers abandoned the routes they had served and sought more profitable occupations elsewhere.

Operated as Incidental Work.

As a business proposition the "jitney" cars are established purely in competition with the trolley company and are operated in the main thoroughfares of the cities, many of them being driven by their owners incidental to constant employment, or by boys and young men after school hours, the principal purpose being to take advan-

tage of the very limited time of the day when the passengers are numerous and make what is regarded as "easy money" for such periods as are convenient for them to work. Obviously there are what may be regarded as processions of "jitney" cars through the main streets near the civic centres at certain hours of the day; at other times the drivers will wait for passengers to appear, and the periods of idleness will sometimes be of considerable length. As most of the machines bear signs which specify the routes traversed and the drivers do not solicit business, the custom is for a driver to start when he has two passengers without reference to time schedules. The cars are not restricted as to routes, and the drivers are



The Double-Decked Omnibus Generally Used by the London General Omnibus Company, the Largest Motor Vehicle Public Service Company of the World.

in active competition with each other, each seeking to make the most of his time without regard to the convenience of the public. These conditions do not benefit the men engaged in "jitney" service, and the public is for the time being tolerant of what obviously cannot be continued indefinitely.

Problems for the Public to Solve.

The "jitney" car operators have been given privileges supposedly as residents and because public sentiment has been more or less antagonistic to the trolley road as a subsidiary of the New Haven road, but innumerable problems have arisen that are being considered by the city councils and the legislature, which will need be

solved. These have not as yet been experienced elsewhere in New England. While the people may favor the "jitney" car service, they are already aware that routes, satisfactory vehicles, qualified drivers, insurance against accidents and proper protection are absolutely necessary.

Considering the machines first of all, those generally in use are small and light, seating usually four passengers besides the driver, and as there is no reason to believe that the public will continue to be so indulgent as to ride on running boards, even were the authorities inclined to permit this, the earning capacity is small, and many trips must be made to serve a comparatively small number. This necessitates large mileage, and this in turn entails expense for fuel, lubricant, tires, etc., and there is no assurance that each trip will be made with filled seats.



Machine Designed for All-Year-Round Transportation of Union School Pupils, That Is Adapted for Public Transportation.

The cars are operated with raised tops, which do not afford the shelter necessary to encourage patronage in the event of storm, and while they may be attractive in pleasant weather, if the service is to be constant something more of the type of the vehicles used for passenger traffic must be considered. In connection with this statement illustration is made of a number of motor chassis that are designed especially for public service. While there is no reason to believe that these would be productive if they were to replace the "jitney" cars, they are representative of what has been proven to be desirable elsewhere.

The regulations that are now pending before the city councils and the legislature are intended to first of all prevent accident and to establish responsibilities of the drivers, as well as to create bonds against which suit can be brought by those

who have occasion to claim damages. The very large number of "jitney" cars used in the streets has already materially increased the dangers of the people, and demands have been made by the press which will influence regulation much more stringent than that which now obtains under the traffic ordinances. The liability of the drivers will be more closely defined and severe penalties will be imposed should these be violated.

Later on, should there be the same conditions experienced elsewhere, Rhode Island precedent will be interesting to municipal authorities.

The Rhode Island Company, which has a very large investment that will be materially affected by the continuance of the operation of the "jitney" cars, has made representations to the city council and to the state, asking that there be such protection given it against a character of com-

petition that is dependent upon individuals without responsibility to the public, and in this there is reasonable justification. The "jitney" car drivers who are dependent upon their earnings are desirous of control as will prevent others doing what they regard as illegitimate business.

The drivers, at the other hand, are beginning to realize that the cars now in use are not adapted

for passenger service in that they are limited to the seating capacities, while they are not constructed to endure heavy loads and operation for from 100 to 150 miles a day without cessation. The earnings of the operators are uncertain, and in addition to this there has not been sufficient experience with the work to know definitely what average cost a mile will be. Expense has been computed on the basis of a day, which is not sufficiently accurate because of variable mileage. Carefully kept figures show that the cost of the smallest cars, well kept, driven without heavy loads, and depreciation in four years will average 8.44 cents a mile, and the accounting is 1-1000 cent a mile and is absolutely dependable. This matter of "jitney" car operating expense will be fully dealt with in the April issue of the Motor Truck.

MOTOR REPAIR SHOPS IN WAR.

THE life of a motor car on the battleground of Europe is necessarily short. Cars are seldom if ever washed, and very rarely overhauled.



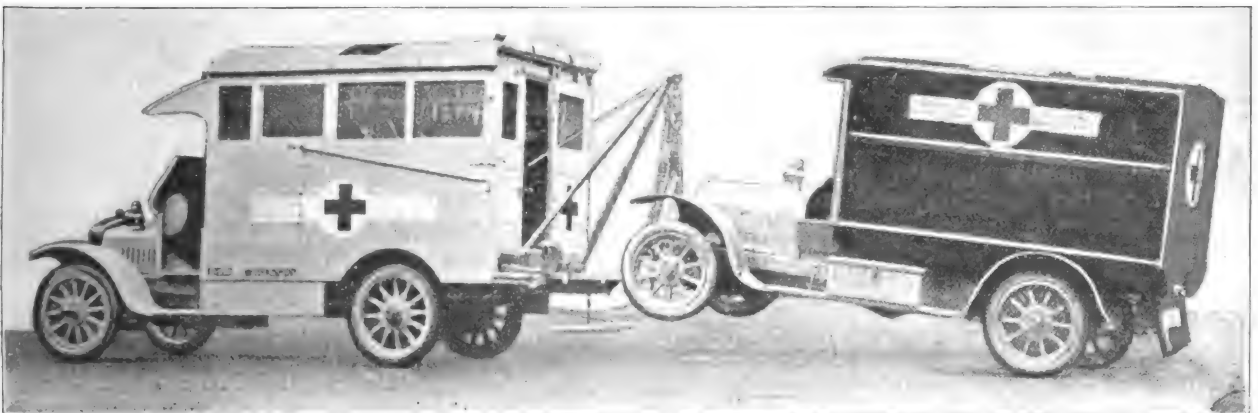
View Showing the Interior of Motor Repair Shop and Machinery.

The roads are so cut by heavy traffic that the best of machines are virtually jounced to pieces. The British Red Cross Society, however, has established a motor repair shop service to accompany its automobiles and bring them back to a state of efficiency, as is described in the English motor vehicle publication, the Autocar.

As will be seen in the two accompanying illustrations, particularly the interior view, these travelling repair shops are complete in every essential detail. Power to drive the machinery and power tools of the car is supplied by a $2\frac{1}{2}$ -horsepower petrol engine through the usual overhead shafting, the engine being located in the forward end of the car where usually the extra passenger sits. A variety of repair jobs can be performed quickly with the machinery. At one side is seen a $6\frac{1}{2}$ -inch centre screw cutting lathe with a six-foot bed, and a hollow head and the usual mandril and chucks. Holes up to half an inch can be drilled by the vertical drilling machine seen in the forward centre, while both rough and final grinding of parts is accomplished upon the double emergency grinder. The repair shop is equipped with an emergency lighting system, the service system being a dynamo, which also charges accumulators, and the emergency being an acetylene lighting outfit.

In addition, there is a small portable forge and a full equipment of blacksmiths' tools, and a very powerful petrol torch for brazing purposes. The work bench, which is provided with drawers and a cupboard, is fitted with a heavy vice, and to accommodate work of any great length in the vice the end of the body is made to drop down. Cleaning back axles, or similar dirty work, is done upon a tailboard bench at the rear of the car, which can be seen in the exterior view, and this bench is protected from rain, etc., by a curtain hood.

The exterior view illustrates how a damaged car can be either lifted or towed by means of a special derrick hoisting apparatus.



British Red Cross Ambulance Motor Repair Shop Demonstrating Method of Towing a Damaged Ambulance.

DRIVING MOTOR AMBULANCES IN WAR.

The duties of a driver of a motor ambulance in the European war are both arduous and extremely perilous, as is testified to by a driver for the British Red Cross Society in the *Autocar* magazine. He wrote, in part, as follows:

"Soon after the commencement of hostilities I was at the wheel of a 20-horsepower Vauxhall. The body had been fitted by a Belgian coach builder to the standard chassis, and this machine, without any sort of care, ran many kilometers before it suffered the fate of so many of its kind by contact with a tree after partial burial in a shell hole.

"The ambulances which collect them (the dead and wounded) have to be driven in convoy of 20 up to the immediate rear of the fighting line without headlights and in pitchy darkness. The leading car is usually steered with the assistance of an orderly perched right on the bonnet, searching for bad holes with the aid of a small torch. In the wet weather the effort to keep on the pave, with the chance of a complete smash should one skid off the secure centre, means a fearful strain, and there is the added terror of stray shells and rifle spent bullets.

"Arriving at the limit of progression one has to await at a temporary depot, the load of 'cases' which are to be conveyed to either a clearing hospital or to one of the very fine ambulance trains that await its arrival at rail head.

"Most ambulance cars are designed to carry four prone or 10 sitting patients, principally with arms or heads wounded by shrapnel or bullets. The scene while waiting is hellish in its character. Loaded up, the convoy has to return jolting and swaying over the awful roads; every movement of the car is punctuated by groans, and, do all one can to avoid the inequalities of the road, it is almost impossible to avoid making the journey a nightmare of suffering to the Tommies within.

"The Red Cross has in its service now many very fine vehicles whose mileage per day far exceeds that of any taxi. Only ordinary landaulet chassis are usually employed, yet these finely designed machines take up their 10 heavy passengers with their full kits and bump them over the roads at a level 25 without turning a hair. The comfort would be increased by fitting much heavier springs with efficient checks. As the cars never see the shelter of a garage until they are in need of repair, the carburetor fitted should allow easier starting up. After a frosty night in the open with fresh, cold water in the radiators,

the morning start is difficult. The clutches often slip rather badly, as a result of overloading; a bigger clutch would obviate the slip. Many of the hospitals have to be approached over very muddy roads where to stop is to stop long, and it is in the endeavor to get one's car to move that the clutch starts to slip.

"The roads present odd smashes; and on nearly all there have been hair-breadth escapes not at all connected with the war. I witnessed a head-on smash between a Royal Flying Corps Rover and a Wolseley loaded up with a medical cargo that was miraculous in that no one was killed. Both cars were doing quite 40 miles an hour, and the Wolseley driver, English fashion, veered to the left, whilst the aviation car held on Frenchwise, the result being a perfect smash, both bonnets being so locked that it was impossible to separate them."

ENGLAND SEEKING AUTO PARTS.

The war having to a certain extent stopped England's supply of automobile parts from Continental Europe, there has been formed at a meeting in Birmingham a representative committee of the leading members of the automobile manufacturing, steel making and stamping industries to find a new source of supplies. The urgency of the situation was pointed out recently by L. H. Pomeroy, member of the Council of the Institution of Automobile Engineers. The committee has held its first meeting and while details were not given out, it was reported that the members are optimistic.

MOVING PICTURES FROM AUTOS.

Australians and South Africans living outside of the larger cities now have moving picture shows brought to their doors in automobiles, the operator of the machine setting up a miniature theatre. One such travelling cinema show has travelled for hundreds of miles over Australia's roughest roads, over which it would have been practically impossible for any system of animal transport to travel.

The British government recently ordered that all motor manufacturing plants in Scotland be placed under government control, as a part of its general plan to accelerate the production of war material. During the progress of the war these plants will be operated on continuous 24-hour schedules in the building of motor lorries for the transport department of the British army.

EIGHT-CYLINDER V-TYPE MOTORS.

Designer of Cadillac Engine Presents His Experiences, and the Society of Automobile Engineers Discusses Its Qualities and Characteristics.

(*By D. McCall White.)

AMONG automobile engineers, manufacturers, selling representatives and motorists there is extreme interest in the eight-cylinder types of engines that have within the past few months been produced for motor vehicle use. The eight-cylinder motor is not a novelty in the sense that there is question as to its practicality, for engines of this number of cylinders have been built and some been used for years, but there is a very general desire to learn in what respects and to what extent the design can be considered superior to the four and six-cylinder machines that are almost universally built and used in pleasure cars.

The following paper, which was presented to the Society of Automobile Engineers, is a statement made by an engineer who has been actively engaged in the development of the Cadillac motor, and following this review was a discussion which was engaged in by engineers who desired more definite facts than were contained in the original presentation for their general benefit. The paper and the discussion are appended:

There is probably no subject which is commanding so much the thoughts and attention of motor car engineers today as the high-speed, high-efficiency, eight-cylinder, V type engine.

As soon as the world began to take cognizance of the new method of locomotion, it also began to demand more and greater achievements. It demanded greater efficiency, flexibility, com-

forts, conveniences and luxuries. It demanded in greater measure those things which heighten the enjoyment and add to the pleasure of motoring. It is demanding with equal insistence elimination of those things which have a tendency to detract from motoring pleasure and enjoyment.

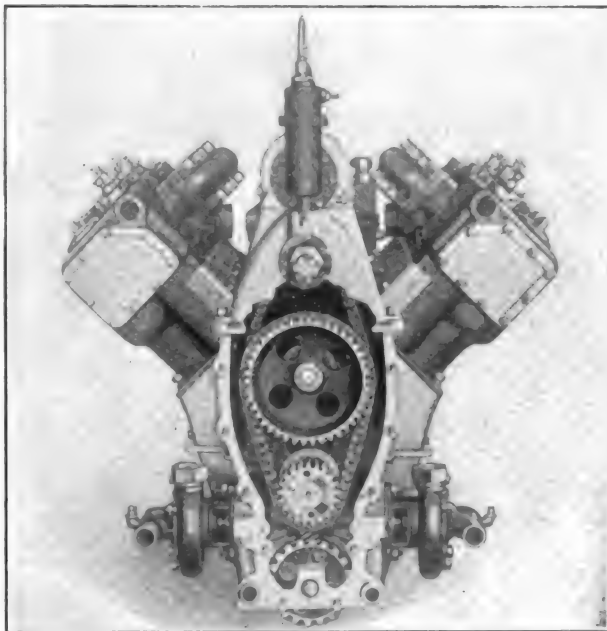
Serious minded motor car manufacturers have vied with each other in efforts to meet the motorists' ideals. You all know of the evolution. From

the single-cylinder to the two, from the two to the four, from the four to the six, and lastly from the six to the eight, which some engineers believe marks the last word in motor car progress in the matter of motive power.

The mere matter of number of cylinders is not, however, of primary importance. The matter of primary importance is the number of cylinders necessary to produce a car which will perform as its user wants it to perform. After analyzing the subject and discovering what the user expects of his car, the next thing is to supply the requirements

in the most practical and best balanced way. Of course, different motorists have different ideals.

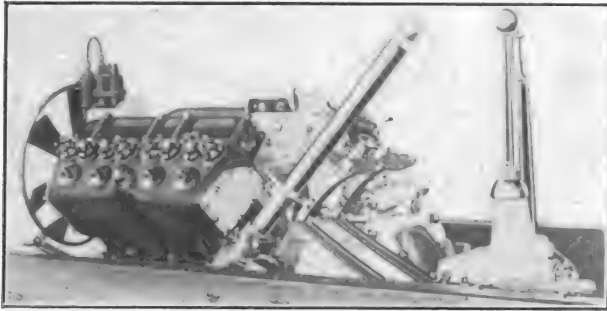
For the man who simply wants a car as a means of locomotion, something that will carry him from one place to another, almost any car of today will serve the purpose. But the man who wants a car that will provide transportation with the greatest possible pleasure and comfort, both mental and physical, must look far beyond that type of vehicle which provides little or nothing beyond a means of locomotion.



Front View of the Cadillac Motor with the Timing Gear Case Cover Removed—The Cooling System Includes a Centrifugal Pump for Each Bank of Cylinders.

*Member of the Society of Automobile Engineers.

The multiplication of cylinders from time to time has not been merely for the sake of obtaining increased power, but rather to obtain a



**Side View of the Cadillac Motor Installed in a Chassis—
The Engine Is Included in a Unit Power Plant.**

steadier or more even generation and application of power to the propulsion of the car. The more evenly the power is applied to the driving of the car, the greater is the comfort experienced by the motorist, and the greater the flexibility for a given development of power.

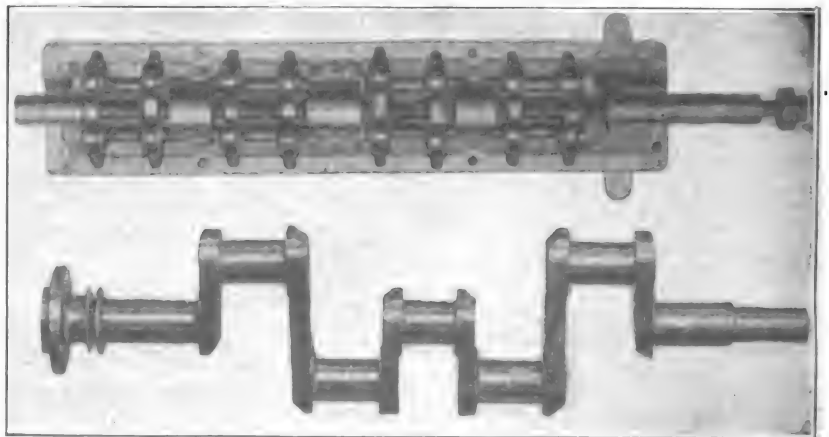
It is not my purpose to disparage other types of motors or other methods of construction, but it would be difficult, if not impossible, for me to make clear the advantages of the V type, eight-cylinder motor without drawing some comparisons. In designing any type of motor it is necessary to keep in mind a number of primary requisites. Among these may be mentioned: Size, proportion, cooling, carburetion, lubrication, accessibility, simplicity, durability and manufacturing possibilities. In the matter of size, I would say that the Cadillac eight is enclosed in practically the same hood space as was the four-cylinder engine. The length is no greater, but there is about two inches greater width, the latter so small a factor as not to be worthy of consideration. When you consider that the eight delivers a maximum of 70 horsepower against about 50 for the four-cylinder engine, the advantages of the eight in this respect are too apparent to require further comment. If we were to attempt to obtain the same power efficiency from a six-cylinder engine, we would require a space approximately 50 per cent. longer for engine installation. One advantage of the compactness of the eight is that it leaves more room for body purposes on a chassis of a given wheelbase.

In the matter of weight the argument is all on the side of the eight. The weight of the present Cadillac engine is some 50 to 60 pounds less than that of the previous four-cylinder engine.

Another advantage of the V type eight from a mechanical standpoint is that it permits the use of a short, sturdy crankshaft having only four throws. With the short crankshaft the periodic vibration or thrashing which has proven so disastrous in engines where a long crankshaft has necessarily been employed is eliminated. The use of a short camshaft is also permitted. In the V type eight there are all the advantages which accrue from the compactness of the four-cylinder engine.

Cooling.

In the matter of cooling the V type eight lends itself very readily to efficiency. In high-speed engines particularly the matter of sufficient heating ability is as important as cooling ability. In the Cadillac eight each block of cylinders is treated as a separate unit, although one radiator is common to both. In cooling, therefore, we have the advantages afforded by four-cylinder construction and avoid the disadvantages which doubtless you all know characterize the six. In the V type eight the amount of surface to be cooled in each cylinder block is so small relatively that the variation in the temperatures of the forward and rear cylinders needs scarcely to be taken into account. The temperature of the cooling water is controlled by a thermostatic arrangement similar to that employed in an aneroid barometer. A thermostat, consisting of a series of corrugations in a copper tube filled with diluted ether, these corrugations being at right angles to the axis of the tube, is fitted inside the suction pipe of the water pump. This thermostat by rea-



The Eight-Cam Camshaft and the Four-Throw Crankshaft of the Cadillac Motor.

son of expansion and contraction under the influence of the temperature of the water controls a valve which in turn opens or shuts off the water supply to the



The Pistons and Connecting Rods of the Cadillac Motor Assembled, and a Half a Bearing.

circulating pump, with the exception of a small amount to the carburetor hot water jacket, which is fed from the hottest part of the cylinder water jacket. When the water is cold the pump merely circulates a small amount of water

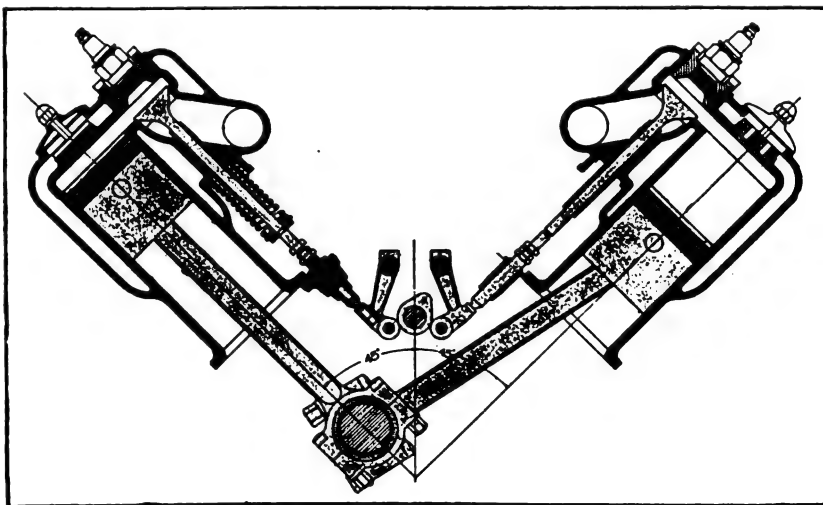
through the carburetor water jacket from the cylinders until the water reaches the desired temperature through contact with the cylinder walls. The thermostat then expands and by so doing opens the inlet valve to the water pump, thus allowing circulation through the cylinders and radiator to take place until the temperature falls to the desired amount, when the thermostat contracts, and partly or fully closes the water inlet, as the case may be, thus maintaining a practically constant temperature of the cooling water, increasing not only the efficiency of the motor, but eliminating any carburetion troubles due to uneven temperatures. Carburetion, as you know, has always been recognized as an aggravating factor in multi-cylindered engines, particularly sixes.

This has been due to the extreme difficulty or, I may say, impossibility of devising means for supplying the cylinders uniformly with gas, as well as lack of evenness in cylinder temperature. In the V type eight there is no difficulty in obtaining practically uniform cylinder temperature and the construction adapts itself admirably to uniform gas distribution. We require only one carburetor, with only one float chamber and one spray nozzle. The carburetor is situated above the engine, between the two blocks of cylinders, midway fore and aft

and transversely. The piping arrangement is such that there is no tendency for the gas to be drawn to one cylinder block more than to the other and after it has been drawn to one cylinder block there is no tendency toward its being drawn into any one cylinder rather than another. Maintenance of uniform cylinder temperature and distribution of gas is a very important factor in attaining evenness of torque.

Lubrication.

As regards lubrication, I think it is obvious that forced lubrication at fairly high pressure is necessary for crankshaft and connecting rod bearings, in order to insure long life. The average life of such bearings so lubricated will almost equal the life of the engine; in any case an average of three years' wear, or approximately 30,000 miles, can be had without any replacement being necessary. So much is this appreciated in Europe that many of the well known manufacturers provide no adjustment whatever on the main bearings, and others locate the lower half of the main bearing directly in the oil base. The methods of lubrication used on the Cadillac eight-cylinder engine are such as to insure high forced oil feed to all the bearings running at high circumferential velocities and subjected to high pressures. An oil pump consisting of two gear wheels is situated at the lowest point on the front cover of the engine, being extremely accessible for examination. This pump is driven at half engine speed and draws the oil through a pipe of ample area, from the oil base, discharging it into a header or large reservoir pipe which extends the whole length of the crankcase, oil feeds being taken from this header to each of the main bearings, which in turn feed oil through the hollow



Sectional Sketch of Cadillac Motor Illustrating the Location and Action of the Camshaft.

crankshaft to the crankpins and the connecting rod lower bearings. The wristpins, cylinder walls and camshaft rockers are lubricated by the residue oil which is constantly coming out from the ends of the bearings. The other end of the reservoir above mentioned is connected to a spring loaded relief valve (situated at the rear end of the engine) to prevent excessive pressures. The discharge of surplus oil is conducted to the camshaft bearings and finally runs on to the front silent chains and the spiral gears, for driving the oil and water pumps; returning to the base through a large gauze filter. The pipe system is tapped before reaching the relief valve, and a lead is taken to the dashboard for registering the oil pressure.

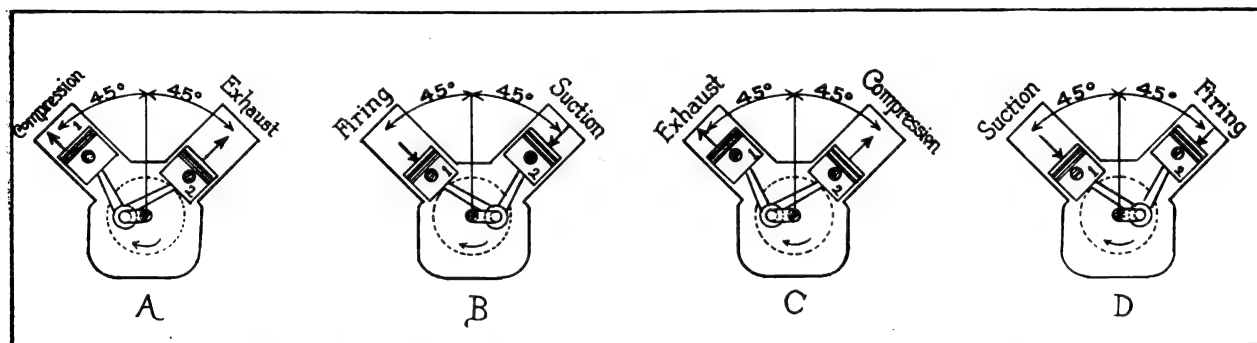
Accessibility.

To obtain access to the carburetor, electric generator, automatic cranking device, ignition current distributor and power tire pump, you have but to raise the hood and these members are

types be taken as a basis for comparison in this connection. In the V type eight we have eight cylinders, pistons and connecting rods, as against six in the six. There are 16 valves as against 12. In the Cadillac eight there are but three main bearings. In a six at least that number is demanded, and certainly more to approach the same rigidity. There are only four connecting rod bearings, while in the six there must be six. The camshaft has eight cams; the six requires 12. It would appear that the eight offers fully as much in absence of complication as the six.

Durability.

In treating of durability we must take several points into consideration. We could not reasonably compare a poorly designed and made eight with a well designed and made six. I do not hesitate to say that taking a well designed and a properly made eight as against an equally well designed and made six, the eight will be doing business long after the six has ceased perform-



Piston Positions in a V Type Two-Cylinder Motor: A, at the Completion of the First Half Revolution of the Crankshaft; B, the Completion of the First Revolution; C, the Completion of the First Half of the Second Revolution; D, the Completion of the Second Revolution.

conveniently before you. Access to the valve tappets is obtained by removing cover plates. Access to the crankshaft is obtained by removing the oil pan of the engine. We have provided a feature which we believe will be welcomed enthusiastically. Above each piston an opening through the cylinder heads is provided. By removing the caps it is possible to remove carbon deposits from the piston heads and combustion chambers without the necessity of taking down the engine.

Simplicity.

In the matter of simplicity versus complications, it is hardly fair to compare the V type eight with a four-cylinder engine, but even in such a comparison the eight would not be at a material disadvantage. Inasmuch, however, as on the subjects of power, torque, flexibility and general roadability the usual comparisons are of the six and the eight, it is only reasonable that these two

ing. Vibration more than any other one thing shortens the life of a motor. In the V type eight, properly designed and manufactured, vibration is reduced to an almost negligible factor; and to the extent that that vibration is reduced, to the same extent is longevity increased.

I might say with reference to the effect of vibration on the life of the motor, that when racing with six-cylinder engines, of which I have done considerable myself, we used to find it necessary to run the car either below or above the particular speed at which the periodic vibrations of the crankshaft were greatest, because the motor absolutely gave up the ghost in continuous performance on the racing track. We either had to reach the maximum power below that periodic vibration speed or above it.

Manufacture.

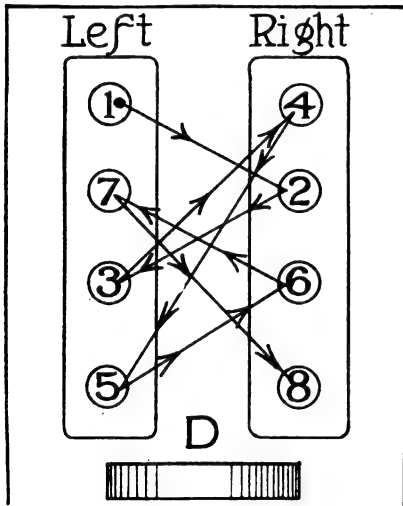
As a manufacturing proposition the eight presents some interesting aspects. There are so

many factors which have a bearing on the subject that it is difficult to arrive at a conclusion in making comparison of the six and eight. To

smooth and quiet is it in action and so even is its torque.

L Head Valves.

Perhaps a few remarks would be of interest on the matter of general design. While it is admitted that with careful design a certain amount of extra efficiency can be obtained with overhead valves, I have been able over certain dimensions to hold my own with the conventional L head type of motor. On engines of normal bore and above, this conventional type of valve gear is, from a manufacturing point of view, easy to keep quiet and also provides sufficient power for all practical purposes. This has been demonstrated in the Cadillac engine having an A. L. A. M. rating of 31.25 horsepower and developing in excess of 70 horsepower at 2400 revolutions per minute. Greater power has been shown and it is possible to straighten the curve so that the line would be continuous from 1600 revolutions per minute, at which speed the engine develops 52 horsepower, up to 2800 or 3000 revolutions per minute. Further proofs of this latter point, on valve design, are the magnificent performances on Brooklands track in England of the four-cylinder "Talbot" and others which made world records for their capacity with an ordinary standard L head motor. Existing types of overhead valve design, while good for racing engines, are likely to introduce increased cost of manufacture, and to create undue noise, factors to be reckoned with in motor designing. In addition, although it may be urged that when the L head type is carried into the V engine, accessibility suffers, it must be borne in mind that all design is a compromise and that we have today such materials in the shape of special alloy steels that



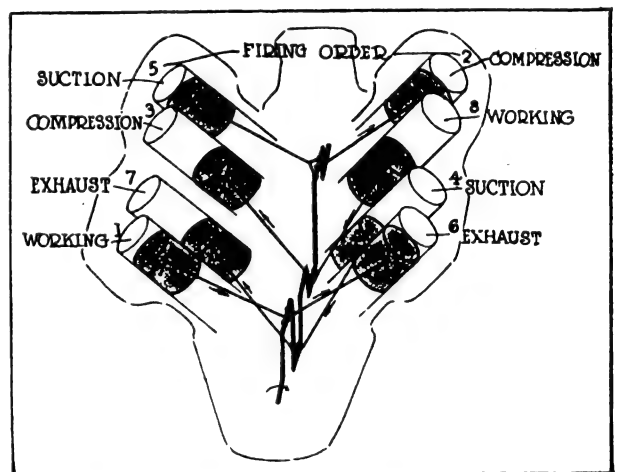
Firing Order of Cadillac Motor from the Driver's Seat.

facilities and methods. In the eight there are some members which are much simpler and less expensive to produce than the corresponding parts of a six; such as crankshaft, camshaft, fewer bearings, etc. On the other hand, there are in the eight more cylinders, pistons and valves to grind.

In addition, we find that in numerous instances it is desirable to work to closer limits of accuracy. Summing up, I would say that on a basis of equally good workmanship in each case, the eight will be found to be a somewhat more expensive manufacturing proposition than a six. This does not, however, take into account the initial expense incurred in new machinery, jigs, fixtures, tools and production equipment.

It has been stated elsewhere that a certain V type eight-cylinder engine is much heavier per unit of piston displacement than a six-cylinder engine. The eight-cylinder engine in question would not be considered light per unit of piston displacement and is of the slow-speed type. While its behavior is excellent, it cannot be compared with the high-speed, high-efficiency eight any more than can the slow-speed four be compared with the high-speed four.

The eight-cylinder Cadillac engine has magnificent torque at low speeds, combined with the snappy acceleration and sweetness of the high-speed engine, giving a most desirable combination. This eight-cylinder engine, designed for high efficiency, gives one more the impression of an electric motor than a gasoline motor, so



Relative Position of the Pistons of a Cadillac Motor at the Beginning of the Explosion Stroke in the No. 1 Cylinder.

adjustment and valve grinding are practically "by words" and need be resorted to only after long periods, the operations, even then, being simple.

Again, when overhead valves of existing design are used with the V type eight, the length of stroke must of necessity be curtailed owing to the fact that each unit block of cylinders must be at least three inches longer in the direction of the stroke and could not be accommodated inside of the engine bonnet. In order therefore to maintain what I consider a proper stroke bore ratio, the L head shows to best advantage.

Inclined valves are difficult to operate on account of the height at which the camshaft must be placed, of necessity above the tappet rollers owing to the fact that there must be 135 degrees from the camshaft centre, passing through the centre of the rollers on each side, in order to give satisfactory results as regards order of firing. An explanation of this order of firing would perhaps be of interest. The firing alternates from one side to the other, so that there is a power impulse from a cylinder on one side followed by an impulse from the cylinder diagonally opposite on the other side.

Firing Order.

That is to say, assuming that one is sitting in the driver's seat, and No. 1 cylinders are at the radiator end of the engine, then we have No. 1 left hand and No. 1 right hand, and so forth. When No. 1 on the left hand fires, assuming the piston to be on top dead centre, then No. 1 on the right hand is half way on suction stroke.

The next cylinder to fire is No. 2 on the right hand; No. 2 on the left hand is then half way up on the exhaust stroke.

Then No. 3 on the left hand fires, and No. 3 on the right hand is half way on suction.

No. 1 right hand fires next, and No. 1 on the left hand is half way on exhaust stroke. The next to fire is No. 4 on the left hand, No. 4 on the right hand being half way on the suction stroke. No. 3 on the right hand fires next, and No. 3 on the left hand is half on exhaust stroke. The next to fire is No. 2 left hand, No. 2 on the right being half on suction stroke. And finally No. 4 on the right, No. 4 on the left being half on exhaust stroke.

It is perfectly simple to follow the firing order of the eight, because all you have to do is to consider two separate four-cylinder engines, one firing 1, 3, 4, 2, and the other firing in the same order, but lagging one cylinder behind, or 2, 1, 3, 4.

In order to maintain what one might term, for want of a better name, "valve gear efficiency,"

it is desirable that all valve gear should be as light as possible; in fact, the reduction of weight in the valve gear should be considered of maximum importance, just as much as the reduction of weight of reciprocating masses such as the piston and connecting rod. If one takes the trouble to run out a few figures on valve accelerations and loads in connection with the high-speed engine, it can be appreciated how necessary it is to design the valve mechanism as light as possible in conjunction with the necessary strength. For instance, if an engine, such as the one under discussion, is running at 3000 revolutions per minute, a thing which can easily happen, the time taken to lift the valve is one two-hundredth part of a second and the acceleration would be 2080 feet per second. To take care of this the valve spring must exert a load of 65 pounds. Now supposing the reciprocating masses weighed one-half pound more than the example given, then the required spring would exert a force of 97 pounds. This point is well taken care of in the eight-cylinder design, where the valve reciprocating masses are naturally less than in an engine with fewer but larger cylinders.

Camshaft.

In the design of the camshaft in the high-speed V type eight, as in all high-speed engines the greatest care must be exercised to insure that the camshaft is well supported on substantial bearings in order to prevent any deflection, so that there will be little noise from the valve mechanism.

The most serious defect that can be attributed to engines having long crankshafts is the disturbance or tremor which occurs at certain periods of engine speed. This periodic tremor or disturbance, no matter how small it is, or how quiet it seems, has a disturbing effect on the transmission, causing the constant mesh or neutral gears to roar or rattle. Transmissions which were good and beautifully quiet have shown this defect when fitted to six-cylinder chassis.

One of the points in connection with the eight-cylinder engine is that the bore of the cylinders being small, reciprocating masses of the lightest design can be used. I am strongly of the opinion that where high-speed engines are employed, none should be designed with four cylinders, above $3\frac{1}{2}$ inches bore. In the Cadillac engine we have the well known 80 millimeter or $3\frac{1}{8}$ inches bore, with which so much has been accomplished in Europe. In a four it is delightful as to size, and when this size is designed into a V eight, the performance surpasses all expectations in whatever direction one may examine.

The construction of the lower bearing of the connecting rod on the Cadillac engine is interesting, in view of the fact that from opposite cylinders there are two rods on each crankpin, the forked or outer rod holding the bearing rigid, while the plain or centre rod oscillates about 30 degrees on the outside of the bearing, which is of hard bronze, the actual bearing in which the crankpin rotates being of anti-friction metal.

It is easy to obtain, without accessories in the shape of starters, etc., a proportion of eight pounds weight per horsepower developed, including flywheel, pumps, etc. I am strongly of the opinion that taking equal conditions one would have to strive very hard indeed to obtain this result with a six-cylinder engine.

As regards the carburetion in the Cadillac eight-cylinder engine, there is no necessity for a double carburetor, splendid results being obtainable from a single carburetor. It is an easy matter to roll along on high gear at $1\frac{1}{2}$ to two miles an hour and accelerate like with an electric vehicle with perfect smoothness up to speeds considerably over 60 miles an hour with a fully loaded car.

Balance.

We find a marked difference between theoretical balance and balance as developed in practise and application. In books and treatises on the subject the practical side of the question is frequently ignored. It should be borne in mind that all bearings have clearances and that all moving parts, whether reciprocating, rotating or oscillating, are not rigid, so that even though an engine may be perfectly balanced theoretically, it may be far from perfect when produced in practise. Every engineer who has designed engines is acquainted with this fact and painfully aware how much this point is forced upon him in multi-cylinder design where crankshafts are long and cylinder bores are large.

I will conclude by making the statement that the Cadillac eight-cylinder engine is designed, and will be manufactured, to be more free from vibration or periodic disturbance than any other multi-cylindered engine of equal total cylinder capacity. One can stand a pencil on end on the front wings of the mudguards and run the engine at a very high number of revolutions per minute, and in addition accelerate the engine, from about 100 revolutions per minute to very high speeds indeed, suddenly, without the pencil falling down, when the car is stationary.

DISCUSSION.

R. McA. Lloyd—I think that the piston displacement of the engine under discussion indicates that it has about

4½ cubic inches per horsepower, at 2400 revolutions; whereas most motors I have been able to get any data on here run about seven or eight cubic inches per horsepower. It seems that Mr. White obtains a very good efficiency in each cylinder. If he had built a two or four-cylinder motor he would probably have produced a very much better motor than is commonly found in America.

I believe an eight-cylinder motor is smoother, easier and pleasanter to drive and has more power for its length than either the six or the four. But personally I doubt whether so much power as is provided in this case is necessary. Of course that raises the question whether cars with such great power possibilities will be produced in large quantities, when a four-cylinder motor built just as well and with about 50 horsepower will answer the purpose. I think there is a serious question whether American builders should go to these higher power motors in a car for the ordinary user, when it is quite possible, with proper transmission, to get along with a good deal less power. I know that it is very nice to have surplus power at times, but it certainly adds weight; a four-cylinder motor of 50 horsepower in the same space will weigh about 25 per cent. less, if designed properly.

D. McCall White—This particular engine is between 50 and 60 pounds lighter than the four-cylinder engine it replaced. It is 12 per cent. smaller, but develops something like 20 horsepower more.

W. R. Strickland—What test was made of gasoline economy compared with the other cars?

D. McCall White—The eight-cylinder engine compares favorably with the four-cylinder engine of the same capacity; we have been getting 18 miles to the gallon. I have seen 22 miles to the gallon with one particular car.

Sydney Bevin—I would like to ask in what instances Mr. White finds it necessary to work to closer limits in eight than in six-cylinder motors?

D. McCall White—Generally speaking, we are required to work to closer limits on the bearings. On account of the way the connecting rods are coupled up, they must be kept to much closer limits than in the six-cylinder motor. They are coupled up in an entirely different way than in the construction used on the four or six-cylinder motor connecting rod. Both rods are on one bearing; although the pressures themselves are directly on the crankpin, the centre rod oscillates about 30 degrees on the outside of the bearing.

Sydney Bevin—It seems to me that the six is liable to greater periodic vibration, and that the bearings have to be fitted much more closely on the six and the four than on the eight-cylinder, which is not subject to such great vibration.

D. McCall White—I think that the expedient of keeping the main bearings tight is not the one to be adopted to avoid periodic disturbances in the crankshaft. You merely reduce the power of the motor by doing so.

L. G. Nilson—I find that by using counter weights on the crankshaft a great deal of the periodic vibration can be eliminated.

A. C. Woodbury—How is that fitting worked out on the outside of the bearing? I understand that there are no shims in the brass, but that the outside of the brass must be round. After the first fitting is made the outside of the brass would be no longer round; then how is the oscillating connecting rod fitted to the outside of the brass?

D. McCall White—We have a special method of fitting the brasses; we hardly scrape them in at all. They are practically mandrel fittings. Those bearings will practically never need replacing. I have seen an engine that has been taken apart after 30,000 miles, and practically no wear was apparent on either the main or connecting rod bearings. They were put back again just as they came out.

A. C. Woodbury—Is the bearing area exceptionally large?

D. McCall White—Yes.

A. F. Masury—Why did Mr. White decide on making the eight with the cylinders opposite, as in the case of the De Dion, rather than set one cylinder block slightly ahead of the other, making a little longer motor?

D. McCall White—By offsetting the cylinders double the number of cams are required on the camshaft and the length of the crankshaft bearing is increased. The connecting rod bearing is of considerable length. If we wanted to keep that length for each bearing, we would have a crankpin about five inches long.

A. F. Masury—But you have two connecting rods on each.

D. McCall White—Yes, but we are using one bearing to do the whole of the work.

A. F. Masury—That is all right when the motor goes out of the shop and you have your factory method of making bearings and fitting them, but you have fitting trouble in the repair shop.

D. McCall White—This bearing may be replaced practically as cheaply as an ordinary bearing. In the offset construction a longer camshaft is necessary, which is to be avoided, especially in high-speed engines.

A. F. Masury—As I remember, it adds about $3\frac{1}{4}$ inches to the length all the way through.

D. McCall White—Yes. The length of the distance between the bearings on the crankshaft is increased as well by about $2\frac{1}{4}$ inches.

F. W. Seeley—The provision of hand holes in the cylinder heads for cleaning out the carbon is very interesting, but it subjects the motor to considerable gasket trouble. I have had experience with marine engines of the removable cylinder head type and never saw one that did not need new gaskets at least every three months.

D. McCall White—The cylinder head is designed in the ordinary way, with a screwed plug in the top, using an ordinary gasket similar to that used on the valve plugs. The one on the top of the water jacket is simply a circular cover which is held down by means of a stud from the inner cover, threaded into the top of the cylinder. Both of these covers can be removed, when a special tool is inserted which revolves, and removes the carbon from the top of the cylinder. The valves are accessible from the valve plugs themselves.

Sydney Bevin—The lubricating problem is a very interesting one, whether it is proper to use light or heavy oil with an eight-cylinder engine. The best lubrication would be determined by the volume of oil going through the lubricating system.

D. McCall White—We carry about a gallon or a gallon and a half of oil in the crankcase, as with all force feed lubricating systems, the pump itself maintaining considerable pressure on the bearings. Two types of oil are used, a thicker type in the summer time and a thinner in the winter time.

Sydney Bevin—So that you arrive at about the same viscosity?

D. McCall White—Yes.

Sydney Bevin—Is the endeavor to keep the water temperature practically constant by the thermostatic regulation?

D. McCall White—Yes.

J. E. Schipper—I would like to know if the diameter of the crankshaft is greater than that of a four-cylinder crankshaft of the same length; whether, on account of the peripheral speed of the bearings the temperatures are higher, necessitating more lubrication.

D. McCall White—No, I think the diameter of the crankshaft depends on the power transmitted relative to its length, with an eight or a four. In the eight you have simply a four-cylinder crankshaft capable of transmitting the horsepower which you demand.

J. E. Schipper—The bearing temperature would correspond with that of the ordinary four-cylinder crankshaft delivering the same horsepower?

D. McCall White—Yes.

W. C. Marshall—Seventy horsepower is not needed in a car. Running a motor which can deliver 70 horsepower you are only getting 30 horsepower out of it most of the time, and therefore must be running it much below its maximum efficiency. In regard to the room taken up by the motor, why not make a V six or a V four? I designed at one time a V four and found it worked out very well; with one valve in the head and one on the side it made a very short motor. The durability of most six-cylinder engines is greater than that of the car. Why have a motor that will outlast the car 50 per cent. more than it does now?

About two years ago I made tests of a number of cars in New York City, among which was an eight-cylinder car of 50 horsepower. I did not realize at the time that that car was doing particularly well but when I came to work up the performances of all the cars tested, using the sigma coefficient formula, I found that this eight-cylinder car performed better than any of the other cars, in four or five different cases. The cars were all tested over exactly the same routes, under the same conditions and at the same speeds. The eight-cylinder car had not been overhauled for two years. It was one of the first cars that the De Dion people put out. I cannot account for its performance, unless the sigma coefficient formula is wrong.

efficient formula is wrong.

H. M. Crane—We found right away when we started figuring on a big, light engine, that the eight was much the best on the weight question, especially where no flywheel at all practically was needed, as in a boat. We superimposed the two crankpin bearings just as has been done since. This may have been done at that time in France. We used practically a marine type of box, lined with babbit metal and fitted it to the crankpin. It was then ground on the outside and white metal fitted in the plain connecting rod outside of that. The bearings, as they were constructed were, however, so big that we have abandoned them. They were $5\frac{1}{2}$ " by $2\frac{1}{4}$ " on a $7\frac{1}{4}$ " square motor.

The difficulty I see with the eight-cylinder car is more a matter of accessibility than anything else. We have so many things to attach to the motor these days that the whole length of each side of a six-cylinder motor does not provide too much room for them. In fact, when you get to reducing the size of the six you begin to look with a great deal of favor on various battery ignitions that do not take up as much room as a magneto and do not need something good and strong to drive them. Last year we managed by driving by chains to put all the accessories on one side, leaving the valves on the other, with a six-cylinder engine of 563 cubic inches displacement. The space on the side on which are the lighting generator, the water pump, the tire pump, the starting motor, the magneto and the carburetor, is pretty well filled up from one end to the other.

I find that with the prevailing grade of gasoline a great deal more difficulty is experienced with valves than ever before; principally from fouling and stems getting dirty. When taking the carbon out it generally pays to go over the valves and reset the lifters if you want to keep the engine fairly quiet.

The difficulty with the eight, from the standpoint of weight, is largely due to the fact that to get an engine nice to handle a reasonably heavy flywheel must be used. Mr. Masury will probably remember the effect Mr. Hewitt obtained when he used a very light flywheel; the machine was too quick on the trigger; if you accidentally touched the throttle, the engine would run away. We found the same thing in the six when we went from the four. Mr. Edge was, I think, responsible for the idea that we did not need a flywheel on the six. We gradually put more weight on and the more weight we put on the more satisfactory were the results. I think you cannot possibly use as light a flywheel on the eight as its torque characteristics would lead you to believe, and still have the car handle nicely in tight places and throttle down closely all the time when running idle.

I agree fully with Mr. White's liking for the short crankshaft, but I think, on the other hand, that in the six it is possible to make a crankshaft with practically no periodic vibration within the ordinary range of driving. The six crankshaft can easily be made larger enough to completely cover that, and it is perfectly possible to use three bearings and get a satisfactory result.

I do not feel at all sure that the European trend in motor design is the right one. I do not think that the ability to get great power with small displacement is necessarily the best arrangement. The minute the effect of moving weights at high speeds is figured, it is realized that the increased power obtained is paid for heavily. That is, the power curve at best is a straight line, while the effect of the revolving and reciprocating masses will not be a straight line but will vary as the square. The point has been reached in some of the foreign designs where the crankshaft, valves, the valve mechanism, etc., used on a 4"x5" engine would look right over here on a 5"x6" engine.

The public apparently like an engine that pulls heavily on the lower end of the scale, where in the case of the ordinary cars of American design the engines pull excellently, that is at between 15 and 30 miles an hour. Whether an engine will develop 50 or 60 horsepower at the high end makes a difference of only a very few miles per hour in the aggregate. A car with 50 actual horsepower will attain a speed of 56 to 60 miles per hour. The same car equipped with a 70 or 80-horsepower motor will attain 65 or 68 miles per hour. To the average man that does not make a bit of difference. He does not want to go as fast as either of those speeds anyway. I know that to be true from experience with a car built to sell at a high price.

Chairman Anglada—From your experience do you judge that gas distribution is more difficult in the eight than in the six?

H. M. Crane—No, the conditions are not very different. The six readily divides itself into two three-cylinder engines and the eight into two fours. I do not see why one should behave differently from the other.

I think Mr. White is entirely too pessimistic about the length of the six-cylinder engine, when he states that it is 50 per cent. greater than in the case of the eight. You can add to a four-cylinder engine two cylinders of the same size you have already used and still not have a 50 per cent. longer engine, because considerable space is taken up by the fan, chain drive, etc., which are very nearly the same in both cases.

As to piston displacement, I figured a four against a six, both around 300 cubic inches, and the four was only five inches shorter than the six; and the four was extremely short.

I think the eight and the six are about the same in weight. I am sure a four can be built lighter. Mr. White does not give due credit for the amount of cast iron that was used in the old Cadillac engines, in which the crankcase as well as the cylinders was cast iron. I am sure he would not hesitate to promise 70 horsepower in a four-cylinder engine of the size of the old one. I agree with him that he would not have as nice a running engine as the eight. I think it is going to be a very pretty fight, but I feel that the six has the call on cost of production. A six with the crankcase built integral with the cylinders, with the top slabbed off, the way all the motors practically are built, is a wonderful construction from the point of view of economy. It is a construction that we can hardly expect to get in the eight. It will probably always mean a difference of \$50 or \$100 in the selling price.

A. F. Masury—On the question of flywheels, we started out on the eight with practically nothing more than a fan, to pull air through the radiator. Then the fan grew smaller and the flywheel bigger until it was man size, as big as most four-cylinder flywheels, weighing somewhere around 120 pounds.

As to extra speed and how many people want it, I took a contract for a car that was to run from four to 70 miles per hour on high. It seemed that we were going to have some difficulty to produce the car. I managed to reach the lower speed. The customer never wanted to go much above 68 miles per hour. Mr. Crane's point is well taken that people really do not want such great speed and power.

I want to bring up again the matter of the thermostat. What would happen in zero weather? Would not the radiator be apt to freeze if the motor became too cool and the thermostat shut down so that circulation was through the motor alone?

D. McCall White—It is impossible for the radiator to get as cold as that, because the temperature of the whole system is maintained very closely. The variation is probably only two or three degrees and the thermostat acts at once.

A. J. Moulton—I would like to ask Mr. White what compression ratio is used in the eight.

D. McCall White—About five to one. It is not necessary to have high compression to get high power. It is only used to get rapid ignition at extremely high speeds.

J. R. Cautley—Is not the V type engine apt to have a good deal of trouble with lubrication? Of course they all have splash lubrication, but if the lubrication of one cylinder depends on the other, does any trouble develop? Do you use baffle plates?

D. McCall White—No baffle plates are used.

J. R. Cautley—You have had no trouble from one side to the other with lubrication?

D. McCall White—No.

H. M. Martin—I would like to ask Mr. White if the forked connecting rods are all on one side.

D. McCall White—Yes.

H. M. Martin—In connection with periodic vibration, do you find in the six-cylinder engine only one period of vibration, or two different periods at different speeds, or perhaps more?

D. McCall White—That depends on the speed at which the engine is designed to run. Generally, in a high-speed six, there are about three periods. The first one begins at about 800 revolutions per minute and the next between 1200 and 1400.

H. M. Martin—So that one bears a certain fixed relation to the other?

D. McCall White—Yes.

J. E. Schipper—I would like to ask how the total weight of the reciprocating parts of an eight compares with that of a four of the same piston displacement.

Can you make the reciprocating weight less per cylinder of the same size, with the V arrangement?

D. McCall White—Considering an eight of a given capacity and designing a four of the same capacity, the total weight of the reciprocating masses of the eight would be less than those of the four, because it is possible to make the pistons on a small bore engine very much lighter in proportion.

A. M. Wolf—I would like to ask Mr. White in more detail about the water circulation. Is it reduced to a minimum through the radiator, so that there is always some circulation through it?

D. McCall White—Yes, the water is drawn by the water pump from the cylinder water jackets through the carburetor water jacket and discharged through the radiator. When the temperature reaches a certain predetermined point, the thermostat operates and allows the pump to circulate all the water from the cylinder through the radiator. There is always a small quantity of water passing through the radiator. The water is practically throttled until the temperature reaches a certain height.

A. M. Wolf—The intake manifold may be a perfectly straight T on a six-cylinder motor, but that might not give correct distribution. I believe that a double carburetor would be the thing for an eight. Have any tests been made, taking manograph diagrams of the pressures in the intake manifold with one cylinder block firing and the other "dead," and then with both blocks firing, to determine if one branch was robbing the other?

D. McCall White—We find we cannot get as much power with two carburetors; that is to say, the engines do not seem to fire as well at high-speed as with one. There is great difficulty in building an engine that will pull at very low speed under heavy load, where two carburetors are employed, the difficulty of adjusting two throttles so that the two four-cylinder blocks will be attuned with one another being one factor.

A. M. Wolf—Can you give any figures of the oil pressure maintained and of the flow per minute at normal speeds?

D. McCall White—The pressure varies with the speed of the motor until a certain point is reached, when it becomes more or less uniform.

A. M. Wolf—Can you give a figure at, say, 1000 or 2000 revolutions per minute or up to the speed at which the maximum pressure is developed?

D. McCall White—At about 1000 revolutions per minute the pressure is somewhat near 20 or 25 pounds; and at higher speeds it depends on the temperature of the atmosphere; as the air becomes cooler, the oil also becomes cooler and more solid, as it were, and therefore the pressure rises.

A. M. Wolf—Where are the points of adjustment of the chain accessory drive?

D. McCall White—The chains are of such size that no adjustment is necessary. They are almost big enough to drive an automobile.

A. M. Wolf—Can you state offhand their approximate size?

D. McCall White—About inch and a half.

A. M. Wolf—There is a statement in the paper that 70 horsepower is developed at 2400 revolutions per minute and 52 at 1600. Can you tell at what revolutions per minute the maximum point of the horsepower curve is reached, where the torque curve begins to drop?

D. McCall White—That depends on how the motor is designed. A motor can be designed so that the power curve will be straight up to more than 3000 revolutions per minute. We do not consider it advisable to do so, because the power is sufficient for all practical purposes without doing so.

A. M. Wolf—I am not speaking about how the motor can be designed. In the motor under discussion as turned out, what are the characteristics of the torque curve?

D. McCall White—The power curve itself is practically straight, so the torque curve must be more or less straight up to a point where it begins to fall off.

L. P. Prossen—Mr. White stated that the pressure of the oil depends on the speed of the motor. I do not see how that can be if a safety valve is used.

D. McCall White—That depends on the pressure on the safety valve and the size of the valve, as well as on the volume of oil pumped in a given time. The safety valve might be large enough to take care of a certain volume of oil up to a certain point, and when that point is reached the pressure would remain more or less constant. When the motor is running fast and the oil pressure rises, more oil leaks from the bearings, whereupon

the bearings themselves act as relief valves. As the speed rises the oil pressure is built up.

A. F. Masury—At low speeds a certain volume of oil must be pumped before the relief valve opens?

D. McCall White—Yes.

A. F. Masury—What do you mean by low speeds?

D. McCall White—600 or 700 revolutions per minute.

A. F. Masury—After that the pressure remains constant?

D. McCall White—Yes.

A. F. Masury—Under ordinary conditions you never run under 600 revolutions per minute.

D. McCall White—These motors run about 75 to 100 revolutions per minute. High pressures are not necessary then.

A. F. Masury—When the torque curve is subject to great variations is that not just the time high oil pressures should be provided? That is, at about 600 revolutions the torque may be anything.

D. McCall White—The torque curve is a straight line, practically, from 100 revolutions up.

A. F. Masury—That is not the case with an electric motor.

D. McCall White—The electric motor is not all that can be desired.

A. F. Masury—It is certainly more desirable in this respect than a gasoline motor.

H. G. McComb—An article by Mr. Heldt in the Horseless Age showed that the unbalanced forces in an eight-cylinder motor tend to produce transverse vibration of the frame. Mr. White might tell us something about that, if he would.

D. McCall White—I think I have covered that pretty thoroughly in the paper, where I said that while any one might write a long article on the theoretical balance of masses, the tremendous difference between theoretical balance and balance developed in practise is not generally considered. It is possible to balance an eight-cylinder motor, as I have explained, so that no vibration whatever is perceptible.

Herbert Chase—Mr. White spoke of the relative power developed by the Cadillac four and the Cadillac eight. What is the difference on the basis of equal piston displacement per minute?

D. McCall White—If I remember correctly the Cadillac four is some 12 per cent. larger in capacity than the Cadillac eight. The eight develops the same power as the four at the same speed.

Herbert Chase—You mentioned the difference in cooling in the six as between one cylinder and another affecting the quality of the mixture. Do you think that is really a serious matter in a well designed six?

D. McCall White—I think that the more uniform the temperature, the better will be the results. It has been my experience with six-cylinder motors on the other side of the water that the temperature does not seem to be nearly so uniform as in the four-cylinder type.

Herbert Chase—In connection with the thermostat you say that when the water is cold the pump merely circulates a small amount of water through the carburetor water jacket from the cylinders, until the water reaches the desired temperature, through the contact with the cylinder walls. Do you mean the water discharged from the carburetor?

D. McCall White—Yes.

Herbert Chase—In other words, there is no circulation through the radiator until the temperature in the carburetor has reached such a point that the thermostat operates and opens the circulating system?

D. McCall White—There always is a very slight circulation of water which is coming from the carburetor, as the pump draws the water from the carburetor itself.

Herbert Chase—In other words, until the temperature of the water coming from the carburetor is raised to a certain predetermined point, there is no other circulation through the radiator?

D. McCall White—No.

Chairman Anglada—That is, the thermostat is in the carburetor circulation and not in the main circulation?

D. McCall White—Yes.

Herbert Chase—Mr. White spoke of only four connecting rod bearings on the crankshaft. Of course, in one sense there are only four main connecting rod bearings, but are there not two other bearings of the forked rod, on the bushing of the central rod?

D. McCall White—No, the forked rod holds the bushing and the centre rod oscillates on the centre portion of the bushing.

Herbert Chase—That bushing, I take it, is made of bronze?

D. McCall White—Yes, bronze backing with babbitt metal on the inside.

Herbert Chase—And the inside of the central rod is babbitt?

D. McCall White—No, steel. The bearing is steel on bronze as with the wristpin bushing.

Herbert Chase—In connection with the matter of weight, Mr. White stated that he was of the opinion that under equal conditions one would have to strive very hard indeed to reduce the weight of a six-cylinder engine to eight pounds per horsepower. If it is not out of order, Mr. Chairman, I would like to ask Mr. Crane if he will give us his views on that question. He has designed some very good six-cylinder motors and I believe has obtained a very large horsepower output per unit of weight.

H. M. Crane—I think that the first thing to do is to get on a common basis as to what we call weight. Our car has a unit power plant at the present time, the weight of which is about 1450 pounds. But that includes the starting motor system, the carburetor, magneto, all piping, a four-speed transmission and flywheel running well over 100 pounds; to which is added a four-inch transmission brake on the front universal, at the back end of the gear box. I do not know of any way in which I can reduce that to engine weight alone but I think the latter is between 800 and 900 pounds. This engine, with a 66-pound compression, will develop around 110 horsepower. It is not light. The crankcase is a quarter inch thick, at least, and is cast with webs leading out to the frame to take the place of the underpan. We built a small engine for aeroplane work, on the basis of motor car practise, with cast iron cylinders, etc. This engine weighed about 200 pounds and developed 45 horsepower. The old "Dixie" eight-cylinder engine was guaranteed at 10 pounds per horsepower, including reverse gear, and we did slightly better than that. It had a bronze crankcase, cast iron cylinders, and was a very heavy job all the way through. It only ran at about 950 revolutions per minute. I think that eight pounds to the horsepower is not at all difficult to get in any automobile engine, in either four, six or eight-cylinder types. As I said before, I believe the four is the best of the lot when it comes to purely a question of weight. But I think it is not a good engine above three or 3½ inches bore where the ultimate of luxury is required.

One of the gentlemen asked Mr. White about the balance of the eight-cylinder engine. I think that perhaps I can help answer that in this way: In the engine under discussion the pistons are very small and I have no doubt extremely light. A four-cylinder engine with pistons of the same weight in the ordinary car would have very little vibration, and in a heavy car the vibration would probably be imperceptible to any one who was not driving. In the eight there are two fours coupled together, resulting in an engine which is nearly twice as heavy. You are dealing, therefore, with a very large mass compared with the mass of the moving weights, and the result is that compared to the ordinary vibrations of running the vibrations of the motor are practically unnoticeable. In the case of the De Dion taxicab, the motor of which is four-cylinder, 2½ by 3, when seated in the back you can hear it, you can feel the man speeding it in low gear, but cannot feel any vibration at all. The eight, adding four cylinders, would be practically vibrationless as applied to the car. I think, however, that no one will dispute that the elements of vibration would be present in a small degree, due to the angularity of the connecting rod, which makes it impossible to balance the piston weights. The piston does not move at the same speeds in all corresponding parts of the stroke; that is, in going down an inch from the top it moves at a different speed than in moving up the same distance from the bottom. That being the case it is impossible for the balance to be perfect. That does not mean that the balance is not very good. It is probably better in a well built eight than it would be in a poorly built six.

In the bankruptcy case of the Century Foundry Company, the referee, C. L. Stone, has named April 19 as the date of the first meeting of creditors, to be held at the bankruptcy court, Syracuse, N. Y.

SUMMER TOUR TO THE PACIFIC.

The date for the Premier owners' tour to the San Francisco and San Diego expositions has been set for Aug. 7. Starting from Chicago, Ill., the expedition will be in charge of Walter M. Bieling, sales manager of the Premier Motor Manufacturing Company, and Harry Newman, vice president and general manager of the Western States Automobile Company, Chicago, distributors for Premier and Scripps-Booth cars.

The route decided upon leads westward over the Lincoln highway to San Francisco, and the Pacific highway to San Diego, the return eastward to be over the Old National Trail route. The party will drive only during the day time, and will be in charge of a man familiar with every inch of the routes, hotel rates, charges for motor fuel, etc. An expert mechanic is expected to accompany the tourists in an especially equipped car, and he will inspect the cars every night free of charge to the owners.

While Premier owners in all parts of the United States are being specially invited to participate, invitation is also extended to any motorist who desires to take part in this first Premier "On to the exposition" overland trip. Present plans indicate that this tour will equal the widely celebrated Premier tour of 1911, when a dozen privately owned Premier cars were driven by their owners from the Atlantic to the Pacific. Further information regarding the tour can be obtained by writing to Frank E. Smith, president of the Premier Motor Manufacturing Company, or to Harry Newman, general manager of the Western States Automobile Company, Chicago.

RECORD SEASON FOR MAINE TOURS.

The touring information department of the Maine Automobile Association, 12 Monument square, Portland, Me., is receiving a volume of inquiries that indicates a record-breaking touring season for that state. So great has been the number of requests for data that the association is preparing to issue its annual book in advance of the usual publication date, probably early in April, at a nominal charge, which is necessary to cover the manufacturing cost.

The 1915 edition will have about 100 complete routes not shown in the 1914 edition, and will cover Aroostock county and every section of the state not represented in previous volumes. In addition a number of routes in New Brunswick, routes between Maine and Quebec, Massa-

chusetts highways, and all the routes through New Hampshire, will be shown. Vehicle, road, game, fire prevention and other laws will be given in a digest.

All the old routes have been rewritten, descriptive matter added and the maps have been redrawn, revised and brought up to date. The maps, printed in colors, are carried separately in a pocket in the back cover. Applications for the book should be addressed to the touring information bureau.

TO VOTE ON CONVICT LABOR.

A proposed amendment to Kentucky's constitution is to be voted upon this coming fall to decide whether convict labor will be permitted upon the state highways. The constitution now prohibits the use of prison labor outside of the prison walls. A similar amendment was voted upon and carried by a large majority two years ago, but the courts decided that inasmuch as it was not advertised within the required time, the vote was unconstitutional. Several candidates for governor have already declared themselves as practically in favor of the measure, while the National Committee on Prisons and Prison Labor is confident that the road amendment will be accepted by a very large majority.

NEW JERSEY MOTOR LAW AMENDED.

The Thomson bill amending the motor vehicle law in New Jersey by prohibiting the use of muffler cut-outs anywhere in the state, prohibiting dazzling headlights and empowering the commissioner to order the installation of an improved dimming device, as well as making several other changes, was signed by Governor Fielder March 31, to take effect immediately.

Automobilists in Maine may be prohibited from flying flags, banners or other emblems from their cars unless the ends thereof are securely fastened so as to prevent their flying in the breeze, if a petition presented to the Legislature is passed.

The services of 4,675 persons were required to raise and manufacture the cotton used by the Goodyear Tire & Rubber Company, Akron, O., for tire fabric and other factory purposes.

Thomas A. Edison will shortly erect a by-product plant to extract benzol from coaking coal at the plant of the Cambria Steel Company.

GOODYEAR'S NEW GUARANTEE.

The Goodyear Tire and Rubber Company, Akron, O., has inaugurated a new guarantee in behalf of its S-V truck tire, whereby purchasers of those tires for a period of three months are guaranteed that if the tires do not outwear competing tires by yielding lower cost per mile, the entire purchase price will be refunded. "The conditions are simple", states C. W. Martin, Jr., manager of the motor truck tire department, "and are outlined in the agreement covering each sale, S-V tires to start running some time as competitors, on the same truck, in same positions—that is, front against front, rear against rear. S-V's must be of the same rated size as competing tires and the latter must be competitors' regular advertised product, purchased in the open market".

GRANT CAR MAKES RECORD RUN.

A Grant Roadster, manufactured by the Grant Motor Company, Findlay, O., was driven by its owner, Fred Richards, a distance of 1,350 miles through Australian sands and up mountain sides with a load weighing, including car, 1,500 pounds, at an average of 35 miles to a gallon of gasoline and 500 miles to a gallon of lubricating oil. During the trip, the car was twice driven to the summit of Mt. Gambier, which is considered locally as an extreme test for any car. Not a single mechanical trouble was reported, and not even a puncture was experienced.

RACING CORRECTION.

It was inadvertently stated in the Automobile Journal, issue of March 10, that Gil Anderson, dean of the Stutz racing team, finished fifth in the Grand Prize race at the San Francisco Exposition grounds, Feb. 27. Complete returns show that he won fourth place in his Stutz machine, his time being 7:31:38, instead of 7:34:51, as stated. Louis Disbrow finished fifth in his Simplex.

ALLEN RETURNS FROM THE WEST.

C. Louis Allen, sales manager for the Pyrene Manufacturing Company, maker of the Pyrene Fire Extinguisher, has returned from a six weeks' tour of the company's sales agencies in the west. During the trip he visited both California expositions, at San Francisco and San Diego, and states they are worth a journey of 3000 miles to see. He found business conditions

on the Pacific coast in better shape than ever before, particularly in his own line, which shows a gratifying increase and justifies an aggressive campaign for more business.

\$15,000,000 FOR FORD OWNERS.

At the rate at which orders are being received at the Ford Motor Company, Detroit, Mich., it is possible that those owners of Ford cars who bought their machines since Aug. 1 last, will receive rebates which may total \$15,000,000, or at the rate of \$50 each. It will be recalled that the Ford company made up its schedule for the fiscal year calling for 1000 cars a day, or 300,000 for the year. At the time of the announcement it was stated that a rebate would be given purchasers if 300,000 cars were produced and sold during the year. Present indications are that the number will be exceeded.

NEW JEFFERY QUAD CATALOGUE.

The Thomas B. Jeffery Company, Kenosha, Wis., has published a catalogue which is profusely illustrated with views showing the Jeffery Quad four-wheel drive, brake and steer in service in the mines of Death Valley, in Texas sand, and the mud of the middle west, as well as upon the pavements of cities and towns throughout the country. The company announces that a few extra copies are available for American distribution.

ROGERS IS MARMON SALES MANAGER.

A. J. Rogers, formerly New York City manager of the Remy Electric Company and later with the Jones Electric Starter Company, Chicago, Ill., has taken charge of the sales service department of the Nordyke & Marmon Company, Indianapolis, Ind.

HOUSE ORGAN FOR APCO.

The Auto Parts Company, Providence, R. I., maker of the Apco line of Ford specialties, is publishing a house organ termed the "Ford Dealer", which contains numerous items of peculiar interest to the Ford dealer and garage men. It is published on the 20th of each month and will be mailed free to the trade upon request.

Motor car registrations in Kentucky last year gained 62 per cent., and it is stated that 20,000 machines will be registered this year.

GENERAL NEWS OF THE INDUSTRY.

New Corporation to Make Partin-Palmer Cars—Willys-Overland Report Shows Big Earnings—Plans for the U. S. Lighting & Heating Company.

PARTIN-PALMER cars are now being made under the direction of the Commonwealth Motors Company, Chicago, Ill., a corporation recently established to carry on the business of the Partin Manufacturing Company. The new corporation has an authorized capitalization of \$100,000.

The Partin-Palmer line was brought out about two years ago by the Partin company, which kept exclusive control of the manufacturing and selling. But being strictly a selling company, it contracted the manufacture of cars to the American Manufacturing Company, Chicago, which became financially involved, closing its plant last January. The Commonwealth company will distribute Partin-Palmer cars to the present dealers, maintaining the name of the car and continuing the same models for 1915. Initial shipments are said to have already begun from the Rochelle, Ill., factory, and quantity production is promised to follow immediately.

The officers of the Commonwealth Motors Company are: C. C. Darnall, president, former general sales manager of the Partin Manufacturing Company; W. C. Whitcomb, vice president, the president of the George D. Whitcomb Company, which assembles the cars at its Rochelle plant; D. G. Kingery, treasurer, a prominent business man of Chicago. W. H. Conklin, secretary and sales manager, and T. J. Shanahan, connected with the manufacturing end, were associated with President Darnall in the Partin Manufacturing Company.

EARNINGS OF WILLYS-OVERLAND.

For the six months ended Dec. 31, 1914, the Willys-Overland Company, Toledo, O., earned a net increase of \$2,853,864, which is equal to 14.26 per cent. earned on the \$20,000,000 common stock

for the six months. The income account shows a net income after deducting expenses, taxes, repairs, depreciation, etc., of \$3,327,499; reserve for contingencies, \$150,000; interest, \$158,400; preferred dividends, \$165,235; common dividend, \$600,000; surplus, \$2,253,864.

The balance sheet of the company, as of Dec. 31, 1914, showed the following assets: Properties, \$9,127,188; patents, good will, trade marks, etc., \$14,059,932; inventories, \$9,648,745; investments in and advances to affiliated manufacturing companies, \$2,251,767; balance due from European distributing agents and affiliated domestic selling companies, less reserve, \$901,942; notes and accounts receivable, \$3,314,939; miscellan-



Mammoth Willys-Overland Plant at Toledo, O., Covering 92 Acres of Ground, Employing About 9000 Men.

eous investments, \$49,925; deferred charges to future operations, \$124,943; cash, \$3,928,098; total assets, \$43,407,482.

Liabilities: Preferred stock, \$4,721,000; common stock, \$20,000,000; real estate mortgages assumed, \$131,500; notes payable (bankers' loans), \$4,434,476; trade accounts, \$3,164,820; accounts payable, \$1,669,273; pay rolls and salaries accrued, \$46,590; customers' deposits, \$291,760; taxes and interest accrued, \$114,021; reserve funds, including reserve for quantity and other rebates to customers, and for car repairs under guarantee, \$1,069,485; preferred stock dividend (paid Jan. 1, 1915), \$82,617; profit and loss surplus, \$7,651,931. The balance shown on June 30, 1914, was \$5,502,233.

HOUK WHEEL EXPANSION.

The plant of the American Spoke and Nipple Company, Detroit, Mich., has been purchased by George W. Houk of the Houk Manufacturing Company, and the machinery will be removed to Buffalo, N. Y., where the Houk company has a plant which at the present time is using 30,000 spokes and nipples daily. The American Spoke and Nipple Company had a capacity of 25,000 per day.

ROHDE PRESIDENT OF SPLITDORF CO.

Beginning with the Splitdorf Electrical Company as a salesman eight years ago, O. J. Rohde worked his way through the organization until



O. J. Rohde, President of Splitdorf Electrical Company.

recently he was elected to the presidency of the company. His activities include an apprenticeship in the company's machine shops to learn the mechanical end of the business, assistant manager and later manager of the Boston branch, of the New York City branch, and treasurer and manager of the Splitdorf Electrical Company of New York, which is a subsidiary of the Splitdorf Electrical Company, Newark, N. J.

PLANS FOR U-S-L COMPANY'S FUTURE.

A stockholders' protective committee has formulated a plan for the reorganization of the United States Lighting and Heating Company, Niagara Falls, N. Y., which the court is said to approve. The plan includes the formation of a new company to be known as the United States Lighting and Heating Company of New York, with a capitalization of \$8,000,000, and incorporated under New York instead of Maine laws. This capitalization is only half that of the old company, and the explanation is the reduction in

the valuation of good will and patents, from \$13,692,000 to \$1,412,000.

The plan proposes \$1,000,000 first mortgage sinking fund six per cent. 20-year gold bonds, \$3,000,000 seven per cent. non-cumulative preferred stock and \$4,000,000 common stock. The right to elect a majority of the board of directors is retained in the preferred stock, which will operate under a voting trust for a period of five years. Preferred stockholders are permitted to subscribe for the new issue and can exchange their holdings on the basis of share for share with a payment of \$15 for each share thus exchanged. Common holders can have \$5 in new preferred and \$20 in new common for each share of common upon paying \$2.50 a share for each share exchanged. Both classes of stockholders can subscribe for the new bonds at a price of \$875 for \$1000 bonds. Creditors have purchased \$160,000 worth of the bonds. The debts of the company and the receivership expenses are stated to amount to \$800,000, which it is proposed to liquidate through sales of the bonds and the preferred stock.

CREDITORS GET 22½ PER CENT.

Creditors and stockholders of the bankrupt Warren Motor Car Company, Detroit, Mich., have received the final report from the Detroit Trust Company, receiver, of the liquidation of the motor company's affairs. The court allowed a 2½ per cent. dividend. The total dividend paid to creditors is 22½ per cent.

STUDEBAKER RETAINS DIRECTORS.

The retiring board of directors for the Studebaker Corporation, Detroit, Mich., was re-elected to office at the last annual meeting of the stockholders held in Jersey City, N. J., April 6. Contrary to rumor, dividends were not declared at the meeting.

The usual quarterly dividends of 1¼ per cent. on preferred and 1 per cent. on common stocks were paid March 15 to stockholders of record March 10 by the Rubber Goods Manufacturing Company, New York City. The next annual meeting will be held April 8 at Jersey City, N. J.

Judge Dillion has appointed J. W. Kaiser a co-receiver with F. C. Myers for the United States Carriage Company, Columbus, O., manufacturer of motor driven hearses.

CHEVROLET BUYS MAXWELL PLANT.

The factory at Tarrytown, N. Y., formerly occupied by the Maxwell-Briscoe Company, was recently sold to the Chevrolet Motor Company of New York City, of which William C. Durant is president. The buildings contain about 150,000 square feet of floor space, the land comprises about 20 acres and the whole property was held at \$250,000. The Chevrolet company is said to be planning the manufacture of a new light automobile. It will be recalled that the Maxwell-Briscoe Company occupied two plants, selling the one known as the Kingsland Point factory to the Chevrolet Motor Company in June, 1914.

HARTFORD AUTO PARTS COMPANY.

The management of the Hartford Auto Parts Company, Hartford, Conn., manufacturer of universal joints and cone clutches, has been re-organized, and new capital added to provide for the large amount of new business on hand and in prospect. Cyrus C. Chamberlin, of the Blake-slee Forging Company, Plantsville, is president; James M. Carney, vice president and treasurer; Harry W. Bigelow, secretary and assistant treasurer. The board of directors, in which is placed the management of the company, consists of the officers mentioned and the following: Edward D. Redfield, president of the City Bank of Hartford; Horace H. Ensworth and John H. Trumbull, president of the Trumbull Electric Company.

KELLY-SPRINGFIELD DIVIDENDS.

Regular quarterly dividends of $1\frac{1}{2}$ per cent. on its first preferred, $1\frac{3}{4}$ per cent. on its second preferred, and $1\frac{1}{2}$ per cent. on its common stocks have been declared by the Kelly-Springfield Tire Company, New York City. Holders of preferred of record March 15 are payable April 1, while holders of common of record April 15 are payable May 1.

PAIGE SALES INCREASE 61 PER CENT.

The Paige-Detroit Motor Car Company, Detroit, Mich., states that its sales for the first two months of 1915 show an increase of 61 per cent. over the corresponding months of the preceding year. During a period of two weeks \$1,000,000 worth of Paige cars were sold at the New York and Chicago shows, 51 cars at the former, and 263 cars by one dealer alone at the latter ex-

hibition. At the Boston show, 80 Paige cars were sold at retail and wholesale. The high average was maintained at other shows in different parts of the country, indicating that prosperity is not confined to one section of the country alone.

DELIVERIES BEGUN BY COLE.

The Cole Motor Car Company, Indianapolis, Ind., began quantity production and deliveries on its eight-cylinder 1915 model about April 1, and expects to be running day and night shifts to take care of its large volume of orders, which the sales department states is the largest in the company's history. The standard parts makers who supply the units in the Cole car have been working over time for the past three months to insure delivery on time.

"We have been keeping in very close touch with the buying tendency of the American motor car market", declared J. J. Cole, president of the Cole company. "We had our en-



J. J. Cole, President of Cole Motor Car Company.

gineers working on the eight-cylinder for months, not knowing how soon it would be necessary to announce an eight, but knowing that it was ultimately coming and would come fast when the right time arrived.

"The very fact that we have been able to hasten the quantity production of a standardized eight-cylinder car again proves the decided advantage of using only standard units built by old established quantity producers.

"I believe that it would have taken one year longer to have accomplished the same results but for our adherence to the standardized units".

The Devine Tire Company, Inc., Utica, N. Y., has filed a petition in bankruptcy, the liabilities being \$33,254 and the assets \$162,663.

PROSPERITY OF AUTO INDUSTRY.

Indicative of the general volume and prosperity of the motor car business in the United States is the statement that the Willys-Overland Company, Toledo, O., maker of the Overland car, conducted a larger volume of business at its Toledo factory from the first to the 25th of March than ever before in any single month in its history. During this period, which contained 23 working days, the number of orders for cars received exceeded the entire preceding month of February by more than 1300, and was double that of the corresponding month in 1914. Orders were received at the rate of 2500 a week, and despite the fact that 1762 freight car loads of Overland cars were dispatched during the 23 days, the orders made rapid gains on the shipments, forcing the Overland plant, employing 8600 men, to work at full capacity, and many of its departments on a continuous 24-hour schedule.

The Willys-Overland Toledo plant is said to handle a greater volume of freight than many cities of 20,000 population. Statisticians estimate that such a city would use about 440 cars for 22 working days. The freight arriving at the Overland plant in the same period of time shows a total greater by more than 61 per cent. The combined incoming and outgoing freight cars would make up a train about 23 miles long.

SAXON BEGINS SHIPMENT OF NEW SIX.

The Saxon Motor Company, Detroit, Mich., has begun shipments of its new Saxon "Sixes," and announcement is made that the production plans of the company provide for an output of 1,500 machines in April, with the expectation that the output for 1915 will reach the total of 35,000 cars. Although the new Saxon factory has 500 per cent. greater production facilities than the plant operated last year, it is said to be working up to capacity every day to meet the orders now on hand.

GIBSON JOINS MADISON MOTOR.

Disposing of his interests in the Gibson Automobile Company and the Empire Automobile Company, both of Indianapolis, Ind., Cecil Gibson goes to the Madison Motor Company, whose plants are at Anderson, Ind., and Berlin, Can. Mr. Gibson takes charge as president and general manager, and his associates are Henry Nyberg, W. E. Moore, C. F. Wood of Washing-

ton, D. C., and Thomas Forbes. It is said that the company will build a four-cylinder car to sell for about \$750, while beginning July 1 an eight-cylinder machine will be manufactured.

WILL PAY 10 PER CENT.

General merchandise creditors of the Speedwell Motor Car Company, Detroit, Mich., may receive 10 cents on the dollar on their claims if the proposition for settlement of the company's affairs by liquidation outside of the court is accepted by all the interests concerned. The merchandise claims against the company are stated to total nearly \$63,000. The court has authorized the receiver to borrow \$10,000 with which to repair certain parts of the plant, and to guard it until operations may be resumed.

DIRECTORS APPROVE INCREASE.

The directors of the Youngstown Sheet & Tube Company, Youngstown, O., have approved a proposed increase of the capital stock from \$25,000,000 to \$30,000,000, and stockholders will be asked at a special meeting called for April 6, to sanction the increase. It is proposed to issue preferred stock, which will make a total for the corporation of \$10,000,000 preferred and \$20,000,000 common. Of the latter \$18,000,000 is said to be outstanding. Opposition on the part of stockholders is not expected, it is declared.

The American Steel Foundries has announced that it will undertake the manufacture of automobile castings, in addition to a great variety of such work, at its Pittsburg, Penn., and Indiana Harbor, Ind., plants. H. K. Gilbert, Chicago, Ill., has been appointed special sales agent for the new department.

The Hub Motor Truck Company, Columbus, O., has been formed, with a capital of \$300,000, to manufacture motor trucks, based on patents held by the Hub Motor Truck Company of America, New York City, a patent holding concern.

Creditors of the bankrupt Norwalk Motor Car Company, Norwalk, O., received a call by Benjamin B. Wickham of the United States district court, referee in bankruptcy, to a meeting on April 10 for the purpose of electing a trustee to succeed A. J. Schur, resigned.

PRACTICAL MOTOR CAR REPAIRS.

SOMETIMES connecting rods snap into two pieces, a result caused by flaws in the material, excess strain, etc. Many times new rods are not immediately available, and should such an emergency arise, a temporary repair can be made as follows: The broken parts should be neatly fitted together and the distance from y to z, shown at Fig. 12 A, accurately measured. Next take both ends of the parts and file until flat and smooth. If the break is of the common type, about $\frac{1}{8}$ -inch will be filed off and this space, indicated at Fig. 12 B, must be filled with a wedge.

Drill a hole for a rivet about $\frac{1}{2}$ inch from each end and $\frac{1}{2}$ -inch machine steel plates should be used, as shown in Fig. 12 C. Holes should be drilled in the plates so that when they are riveted in place the rod will be about $\frac{1}{32}$ -inch short in length. A wedge should now be driven between the ends and riveted to prevent working out. The full repair is shown at Fig. 12 D.

OIL INSULATES COMMUTATOR.

Many owners of pleasure or commercial cars of the one-cylinder type, have been troubled at times with loss of power or irregular firing. There are many causes for this, but one of the most common is to be found at the commutator. In many of the older types and also in recent one-cylinder models the commutator is located at the side. When the parts become slightly worn, oil will leak out on the roll and cam. As the roll turns with the cam, many times the oil interferes with the free passing of the current. A remedy that will overcome this difficulty is to make the roll tight, so that when the cam hits it the oil will be wiped off and a good contact will be the result.

RECUTTING OIL FILES.

Files that have seemingly been so worn as to be useless can be made serviceable by convenient and inexpensive treatment. Dissolve four ounces of salaratus in a quart of water. Mix four ounces of sulphuric acid with a quart of rain water, pouring the acid slowly into the water. These proportions obtain for any volume of liquids. The diluted acid should be kept in a glazed earthenware jar. Boil the files for a half hour in the salaratus water, wash and dry them. Then immerse the files in the acid, from six to eight hours for fine files and 12 hours for coarse files, after which they should be washed with

clean water, dried and covered with a light coat of sweet oil. Files may be recut as many as three times by this process, and the liquids may be used for each process if properly preserved.

WORKING RUSTED BOLTS AND NUTS.

In repairing a motor car, it is sometimes necessary to drive a stubborn bolt out of place because it has become firmly fixed by rust. In driving a bolt, even if great care is taken, the thread becomes bruised and many times, before it can be replaced, the thread must be repaired.

When a die is not available, a simple and practical thread corrector can be made from a

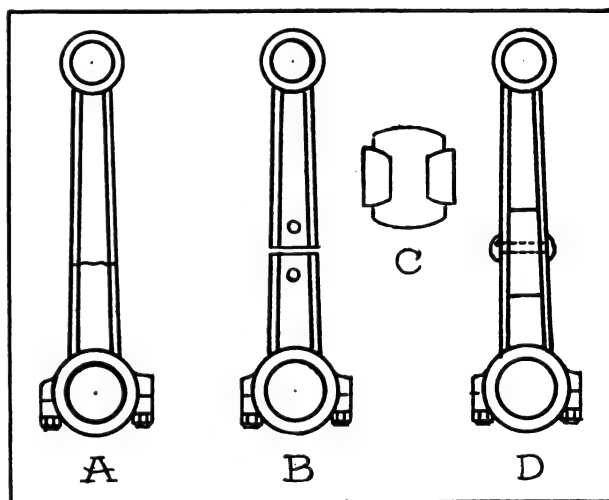


Fig. 12—A, Broken Connecting Rod; B, Pieces of Rod Filed True, Drilled and Separated; C, Cross Section of Rod with Reinforcing Plates Fitted; D, Rod Wedged and Riveted to Prevent Movement.

steel nut of the right size to fit the thread. Anneal the nut and with a three-cornered file, carefully file a V shaped slot across the threads and a little deeper than the bottom, as shown at Fig. 13 A. A very fine file should be used so that no burrs will be raised at the edges. The nut should now be heated to a light straw color and tempered in the usual way, using lard oil, water, or the like. Screw this nut on the threads several times and it will straighten them so that the original nut can be replaced without difficulty.

A set of these handy tools can be made from a number of standard sized nuts, and they will accomplish the work as well as the more expensive stocks and dies.

In removing inaccessibly placed nuts and

bolts it is often necessary to screw these out by driving them with a punch or chisel placed against the corners. Many times this practise

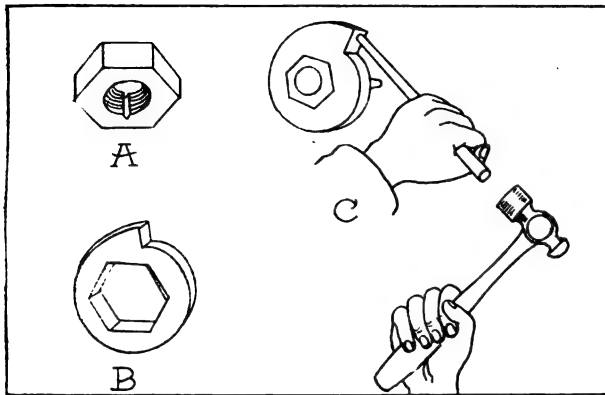


Fig. 13—A, Nut Threads Cut to Form a Die; Handy Spanner to Use for Starting Nuts and Bolts; C, Method of Using the Spanner.

renders the nut or bolt difficult, or impossible, to use a wrench upon. A spanner, as illustrated in Fig. 13 B, is quite easy to construct, and can be placed over the nut or bolt head, and the projection struck directly by a hammer or by a chisel struck with a hammer as shown at Fig. 13 C.

SILENCING OVERHEAD VALVES.

Many cars are equipped with what are known as overhead valves. For the purpose of noiseless operation, fibre rolls are usually installed on the valve arm at a point where it touches the valve stem. As a rule these rolls are allowed to rotate as they please. Sometimes they rotate with a certain amount of regularity, while at other times they remain stationary and the wear is, of course, uneven.

In order to have a smooth running motor, it is one of the essentials that the valves must all be set alike. This becomes an impossibility when the rolls are allowed to turn at their pleasure, because the rolls will wear unevenly and the result will be uneven timing. A conventional construction is shown at Fig. 14 A.

A simple method to overcome this difficulty is to remove the valve arm from the motor and slight-

ly rivet the pin upon which the roll is located. It will only require a small amount of riveting to make the roll stationary. The valve arm and the roll as adjusted is shown at Fig. 14 B. You can now time the valves with some regard as to accuracy.

When the roll becomes worn so that a larger gap than is required appears between the roll and valve stem, adjustment can be made by letting out on the push rod adjusting screw, or it does not require much force to turn the roll in a new position.

CEMENTS FOR CELLULOID.

A cement that can be used for cementing celluloid, either sheets or parts, can be made with three parts of alcohol and four parts of ether, which are mixed and applied with a brush until the edges or surfaces of the parts to be cemented become warm. The parts should then be stuck together and dried for at least 24 hours. Another very satisfactory cement can be made with one part of camphor, four parts of alcohol and five parts of shellac, the shellac being added when the camphor is thoroughly dissolved. Both these cements are very volatile and evaporate quickly. They should be kept in tightly closed containers.

ANNEALING CAST IRON.

Frequently cast iron is so hard that it cannot be worked easily with hand tools, such as files, drills, etc., and when such work is necessary time can be saved and the strength of the part retained if it is annealed. This may be done by heating the metal in a slow charcoal fire until it is a dull

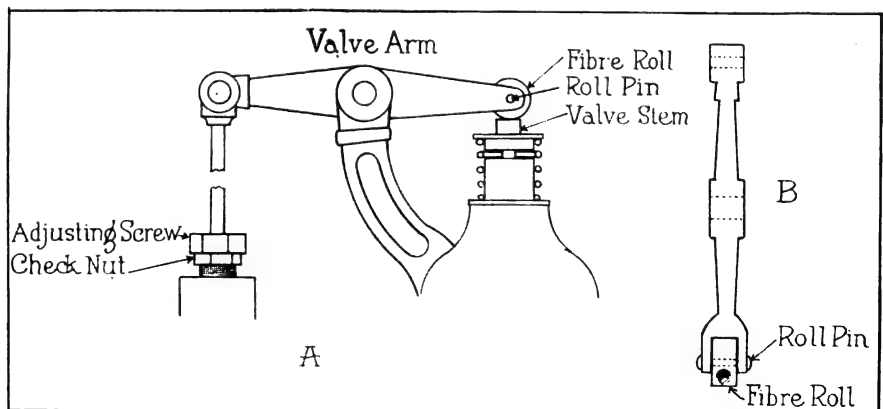


Fig. 14—A, Conventional Overhead Valve Construction in Which Worn Rolls Cause Noise and Uncertain Action; B, Manner of Riveting the Pin on Which the Roll is Mounted.

red, when it should be buried to a depth of two inches of powdered charcoal and covered with a thick layer of ashes and allowed to cool. By this method hard cast iron can be sufficiently softened so that it may be worked readily.

EMERGENCY REPAIR OF A WHEEL.

Should the hub casting in the rear wheel of an automobile become broken to the extent that it cannot be driven by the key in the axle, an emergency remedy is as follows: Take a pipe wrench and fit it tight on the axle and then strap to a spoke of the wheel. This is illustrated at Fig. 15. The power will then be transmitted from the axle to the wheel. The wheel may wobble considerably, but it is almost impossible for it to come off or loosen the grip of the wrench.

CLEANING BRASS CASTINGS.

Brass castings are generally cleaned of grease before working them, which can be done by first boiling in a solution of potash or lye and then pickling. The pickle most favored by practical mechanics consists of a quart of nitric acid diluted with from six to eight quarts of water. After immersion in this the casting is washed with warm or hot water, and then pickled for a second time in a bath of one quart of sulphuric acid, two quarts of nitric acid and a few drops of muriatic acid. After this bath the metal is washed with clean water.

CEMENT FOR CAST IRON.

An excellent cement for cast iron, that will serve an excellent purpose for stopping leaks, closing cracks, etc., can be made with 16 ounces of cast iron borings or filings, two ounces of sal ammoniac and one ounce of sulphur, which are mixed well and kept dry. When used one ounce of this powder is mixed with 20 ounces of iron borings or filings, thoroughly stirred with sufficient water to form a stiff paste.

SURFACE HARDENING SMALL PARTS.

To toughen and surface harden small cast iron machine parts that are subject to wear, such as small gears, cams, etc., heat to a dull red and quench in a saturated solution of cyanide of potash and water, which should be kept as near boiling point as possible. This can be accom-

plished best by putting the solution in an iron pot near the fire in which the parts are being heated.

DRILLING HARD STEEL.

Hard steel can be drilled with ordinary steel drills by the use of a lubricating solution composed of one part of spirits of camphor (a saturated solution) and four parts of turpentine, which is well mixed and applied cold a short time before applying the drill. The drill should be driven slowly, with a fine feed.

TESTING ENGINE HORSEPOWER.

A very simple, yet accurate, way to determine the brake horsepower of a gasoline engine is by the following method: Fasten a number

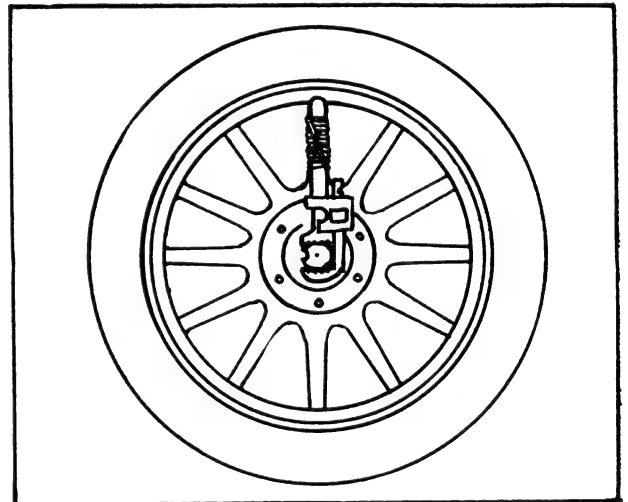


Fig. 15—Emergency Repair of a Broken Wheel by a Stillson Wrench Gripping the Axle with the Handle Strapped to a Spoke.

of pine blocks to an old piece of belting. For a small engine, blocks of the two by four-inch dimension will be sufficient. Recess the blocks so that they will fit over the rim of the flywheel and not fall off. Have a play of about one-half inch in the recess so that the blocks will not bind to the sides of the flywheel rim.

The blocks are fastened by screws to a piece of belting that is long enough to reach over the wheel and hang below centre on each side. Fasten a bucket at either end of the belt, having one larger than the other. The large bucket should be at the pulling side of the wheel. This apparatus is shown at Fig. 16. Place sand in both buckets until they balance and then start

the engine. Keep adding sand to the larger bucket until the engine is working to almost its limit without effecting the speed. Let the en-

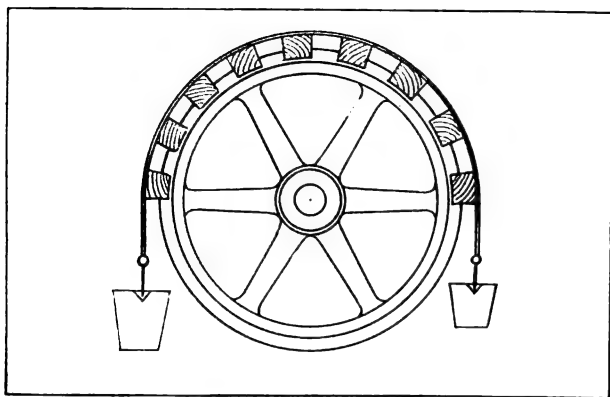


Fig. 16—Testing a Gasoline Engine for Horsepower by Weighting the Flywheel and Using a Simple Formula.

gine run in this manner for two or three minutes to make certain the balance is correct, then stop it and weigh the contents of each bucket separately. The difference in weight is the actual number of pounds pulled. Multiply the circumference of the wheel by the number of pounds pulled, this will give the number of revolutions to the minute. Divide this product by 33,000, the result being the actual brake horsepower in figures.

REPAIRING LEAKY RADIATORS.

Many car owners who make it a practise of doing their own repairs, have usually either at one time or another been troubled with a leaky radiator. If the leak is small, difficulty is often encountered in locating it. A simple and positive way of finding it is to subject the radiator to air pressure. Take pieces of tin and solder them on to all the openings, such as water connections, overflow pipe, etc., as indicated at Fig. 17 A. At the filler opening of the radiator a connection

must be made for the purpose of attaching a pump. This connection is easily made by taking an old valve stem from a tire and soldering to the centre of the tin, an adaptation shown at Fig. 17 B. After you have made sure that all the openings have been closed, place the radiator in a tub of water and commence pumping. Bubbles will rise to the top of the water and by tracing these the leak can be found. After fixing the leak this is a sure test that the radiator is water tight.

If the leak should be in the small cooling pipes between the reservoirs, it will be necessary to cut away the strips of metal which protect them. Remove only enough so that you can get to the leak. This repair is shown at Fig. 17 C. After repairing the leak these strips can be replaced by strips of sheet brass, correctly bent and soldered.

These strips can be conveniently made from sheet brass of 1/32-inch thickness. Cut in strips of required length and width and then bend in the centre. Have the ends join with the ends of cut strips and then solder. Take a pair of flat-nosed pliers and straighten to correct shape, then with a file smooth the rough or high places caused by the solder. The flat and bent pieces of metal and the manner of using them are shown at Fig. 17 D.

GRINDING VALVES AND PISTON RINGS.

Although there are many opinions as to when a valve has been sufficiently ground, a safe method is to grind the valve until a shiny line is visible for the entire circumference. By using fine emery or ground glass, if the valve is properly ground, a very bright circle will be produced. This is an advantage over the Prussian blue test, because the blue is not always smeared on the valve seat evenly, and often tends to mislead the mechanic.

On many high priced cars the piston rings

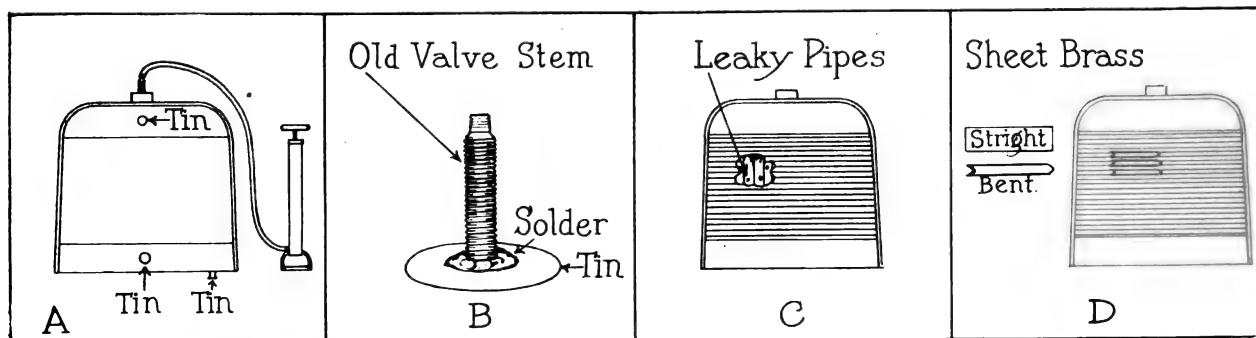


Fig. 17—A, the Vents of the Radiator Closed for an Air Pressure Test; B, Tire Tube Valve Used to Secure Air Pressure; C, Metal of Radiator Cut Away to Repair Leak; D, Strips of Metal Soldered on to Complete Job.

are treated in the same manner. A block of wood is placed in the combustion chamber to prevent the piston from going beyond the cylinder wall.

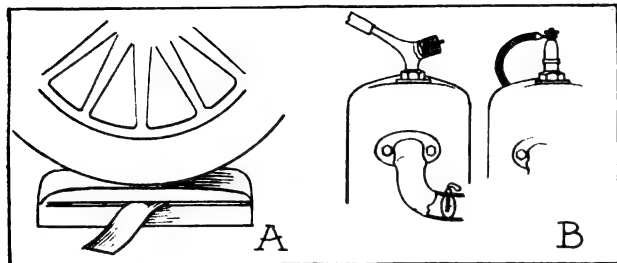


Fig. 18—A, Pressing a Patched Tire Tube Beneath a Wheel to Compress the Repaired Surfaces; B, Poppet Valve Tire Pump That May Be Operated by the Engine.

Evenly coat the wall of the cylinder with a mixture of ground glass and oil and proceed to lap the rings until a bright circle is visible for the entire circumference. Usually one ring is lapped at a time. This treatment of valves and rings insures a very high compression.

PRESSING A TIRE TUBE PATCH.

A motorist who is obliged to repair an inner tube on the road can apply sufficient pressure to the patch by the use of two wooden blocks. They should be about five inches wide and nine inches long, with a curve cut on the one used on top. After applying the patch to the tube, place it between the blocks and place under one of the inflated wheels. These blocks are easily made and conveniently carried. The blocks and their use are shown at Fig. 18 A.

CATCHING SMALL SCREW THREAD.

Many mechanics find it clumsy and difficult to hold small screws with the fingers and use a screw driver at the same time. An easy remedy for this difficulty is to take a small piece of thin flexible wire and make a loop at the end. Have the diameter of the loop equal to that of the body of the screw. When the latter is placed in the loop it will be held steadily and can easily be inserted in the hole. After the threads have caught sufficiently the wire can be removed by pulling. This will straighten and readily free the screw. The use of the wire is shown at Fig. 19 A.

Many times nuts cannot easily loosen from their studs, but with a little patience and perseverance they can be turned. Rust is one of the elements that make the nuts seem immovable. As kerosene oil is an enemy to rust, an application

of it sometimes solves the problem. When the rust has settled low in the threads, kerosene cannot reach it. When this condition arises heat often times is a fine remedy. Take an untempered spanner wrench and heat it with a blow torch. When hot apply to the nut. The heat from the wrench will expand the nut and with reasonable pressure will move it. If it cannot be moved by this method try hammering on the corners of the nut, also applying the heat and the kerosene.

This difficulty is often encountered on chain driven trucks having a male and female screw holding the jack shaft. By applying the kerosene to the screws and the use of a blow torch, the screws are frequently separated.

HOME MADE SPARK PLUG TIRE PUMP.

One of the cylinders on an automobile may be utilized to pump air into tires by the use of the attachment shown at Fig. 18 B. Remove the spark plug and in its place insert the device. The pump consists of a poppet valve inlet and an outlet suitable to attach the air hose. A butterfly valve is placed in the manifold to shut off the intake of gas. The shutter is devised so as to lock both open and shut.

PULLEY OR GEAR SPOKE REPAIR.

A cracked spoke on a pulley or gear may be permanently repaired by drilling a hole through the crack and inserting a substantial rivet. The rivet heads will prevent any side play in one direction, while the shank will prevent play at right angles to this. The repair is shown at Fig. 19 B.

Spark plugs too tightly screwed in or rusted are difficult to remove. To loosen them make a mold of putty in the shape of a retaining cup about the plug and fill it with kerosene. Allow to soak 12 hours before attempting to start it.

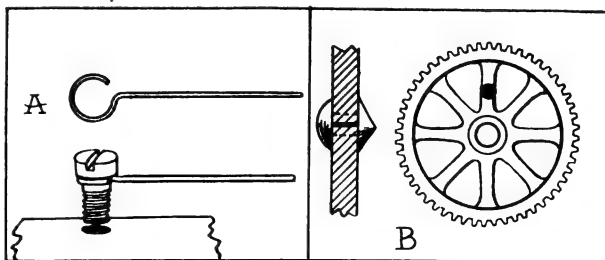


Fig. 19—A, Method of Handling Bolts and Screws in Places Inaccessible for the Hands; B, Broken Spoke of a Gear Repaired by Riveting.

COMFORT OF NATIONAL CARS.

The luxurious seating arrangement of the new National parlor car, manufactured by the National Motor Vehicle Company, Indianapolis, Ind., is winning the admiration of the feminine motorists. The new model has four individual arm chair seats, as shown in the accompanying illustration, that are deep and massive and can be turned around or moved forward or backward at will. The arrangement permits the passengers to face each other and enjoy the sociability of home or the railroad parlor car. The driver's seat can be moved as near to the controlling members, or as far away, as may be desired. An aisle is between all four seats, and in the rear of the body, which is shaped like a boat and is entirely upholstered in the interior, is a concealed folding extra seat that can be quickly lowered for



Luxurious Parlor Car Seats of the New National Model. Chairs Placed On Ground To Show Construction, Etc.

an additional passenger. This arrangement makes for comfort.

AUTOMOBILE MEN HONORED.

At a recent election of the Chamber of Commerce of Indianapolis, Ind., two local men long identified with the automobile trade in the middle west were elected to office. Fred I. Willis of the Hershey-Willis Company, dealers in cars and accessories, was chosen as president, while Warren D. Oakes, president of the Oakes Company, was elected general secretary.

PLAN TO MAKE BENZOL.

Several steel manufacturing companies of Pittsburg, Penn., are stated to be planning to make, or already have made, improvements to

their by-product plants which will increase the production of benzol, and it is estimated that within a year the daily amount produced will total about 20,000 gallons. One company has announced that contracts have been awarded for 92 additional by-product coke ovens, costing approximately \$1,000,000, which will increase in large measure its production of benzol. Another large concern is said to have completed similar arrangements of nearly equal proportions.

AUTO TRIPS THROUGH INDIANA.

The Hoosier Motor Club, Indianapolis, Ind., has named April 18 as the day on which will be begun the series of Sunday tours to the battlefields and other historic points in Indiana. The idea, intended to stimulate interest in motoring and to develop a wider knowledge of Indiana's history, was conceived by W. S. Gilbreath, secretary of the club, and John Guy Monihan, chairman of the runs of tours committee and general manager and vice president of the Marion Motor Company, Jackson, Mich. The first tour will lead to Lafayette and the Tippecanoe battlefield, and later tours are expected to include visits to the burial place of Nancy Hanks Lincoln, mother of great emancipator; to Vincennes, the original seat of the state government, and many other interesting places. It is an idea that could be adopted by other motor clubs throughout the country. Such tours would broaden a motorist's knowledge of the former glories of his locality, stimulate his pride in past generations, and create a comradeship among club members that would react to the benefit of all.

The Enger Motor Car Company, Cincinnati, O., is advertising a contest for a slogan suitable to the Enger "Eight" car, the winner to receive cash at the rate of \$100 a word, the maximum of words being fixed at 20. The contest closes May 1.

The Regal Motor Car Company, Detroit, Mich., is distributing a beautifully lithographed wall poster, measuring about 15 by 30 inches, and showing the new model Regal car for 1915 standing in a road before a mountain summer resort.

A. A. A. HAS COMPETITION.

THE dissatisfaction felt by the American Association of Fairs and Expositions against the American Automobile Association since the latter suspended the Detroit track for permitting an unsanctioned race to be run there, reached its crisis in the formation of the International Motor Contest Association, which will have a permanent office in Chicago, Ill. George W. Dickinson of Detroit, Mich., is chairman of the board of directors.

The organizers state that the new organization will differ radically from the A. A. A. in the following respects: It will be entirely a mutual organization with only a paid secretary and no other salaried officers; cost of sanctions will be rated according to the size and class of track; no arbitrary rules will be adopted to control either driver, mechanic, promoter or track.

RACE HORSE GIVES WAY TO AUTO.

Sheepshead Bay race track, the famous speedway for equines, has been bought by the newly organized Sheepshead Bay Speedway Company from the Coney Island Jockey Club for the reported sum of \$2,240,000, and will immediately be converted into a speedway for automobile racing cars. The plans indicate that this will become the world's greatest automobile course, it being so laid out that, according to a racing expert, the turns can be taken at a speed rate of 110 miles an hour. The course as planned will be a half mile shorter than that at Indianapolis, whose turns are banked to 15 feet high. The Sheepshead Bay speedway will have turns banked 24 feet high.

The course will be two miles in circumference and 80 feet wide and built of concrete and steel. The inside oval will be used for other sporting events, football, aviation meets, etc. The grandstand as planned will be the largest ever constructed in this country, with an estimated capacity of 100,000 spectators.

The Sheepshead Bay Speedway Company was incorporated recently with a capital of \$2,500,000 by dummy directors, \$1,000,000 preferred and \$1,500,000 common stocks, all of which has been subscribed, the heaviest investors being automobile men in New York City and in other cities as far west as Chicago. It is planned to open the motordrome on Labor Day with a series of auto-

mobile races among the leading American and European drivers. It is expected that the event will bring together more of the world's crack drivers than any previous event in this country.

CHASSAGNE AT INDIANAPOLIS.

At the next Indianapolis speedway event, May 29, a feature of the competition will be two of the leading European racing drivers, former team-mates, pitted against each other in two foreign made cars. They are Dario Resta and Jean Chassagne, both of whom drove for the English Sunbeam company. As everyone knows, Resta recently won the two chief events at the Panama-Pacific Exposition. Chassagne holds the world's hour record.

When Resta left the Sunbeam company to drive the Peugeot, Chassagne was given the captaincy of the company's racing team, and has been entered to drive a Sunbeam at Indianapolis, where, at last year's race, he had excellent prospects of winning first place, until his car was overturned. Until recently he was serving in the French artillery in a naval garrison at Marseilles, with no prospect of release. But the military authorities relented and Chassagne was given a furlough so that he might compete at Indianapolis.



Jean Chassagne, Driver of the English Sunbeam Car.

Formal application has been made by the Pacific Racing Association, recently organized at Los Angeles, Cal., for affiliation with the Automobile Club of Southern California.

REFINEMENTS OF OLDSMOBILE CARS.

THE model 42 Oldsmobile is a continuation of the light four-cylinder motor type that has been built by the Olds Motor Works for two



Front View of the New Oldsmobile Model 42 Automobile.

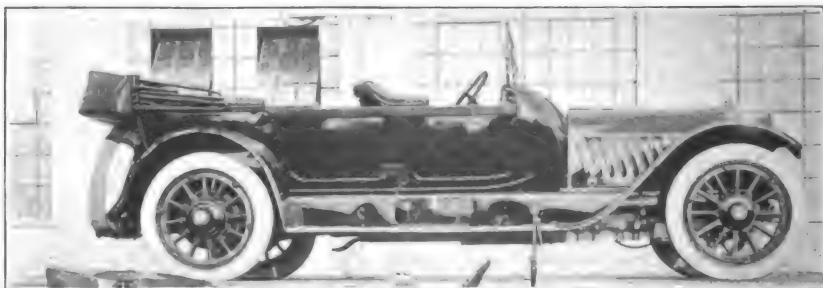
years, but it has been perfected mechanically, and its body equipment is practically that which has been one of the features of the Oldsmobile six-cylinder car that is, the chassis is not only greatly improved, but the body is handsome in design, is well built and capitally finished, and it has every convenience that will contribute to the comfort and pleasure of the passengers.

The chassis has wheelbase of 112 inches and tread of 56. It has a unit power plant that includes a four-cylinder four-cycle water-cooled I-head motor, a clutch and gearset, that is mounted on a sub-frame. The cylinders are cast en bloc, with the head separate, the two castings having the water jackets integral. The cylinder casting includes the upper half of the crankcase, which carries the main and the crankshaft bearings, the lower half of the case being aluminum, with the oil reservoir integral. The cylinder head block contains the intake manifold, which is water jacketed, this being on the right side of the motor, and the valves, which are located on top of the head, are actuated by long push rods that extend through passages cast in the head and protected against high temperatures by the water jackets. The head is secured to the cylinder casting by a series of bolts and

is seated against a water, oil and gas-tight gasket.

The cylinder block includes the expansion chambers only, but in the head are the combustion chambers with the spark plugs inserted at an angle directly under the exhaust manifold. The pistons are long and are fitted with three expansion rings. The crankshaft is large, mounted on three bearings, and the camshaft is at the right side of the motor, with the valves at the left side. The outside secondary shaft carries the fan belt pulley, and drives the water pump and the electric generator. The rocker arms that operate the valves are mounted on top of the head. The valve tappets are a mushroom type and these operating in generous guides, lift the long push rods, the rods being fitted with ball ends that are fitted in sockets in the ends of the rocker arms, being provided with means of adjustment to compensate for wear. The valves operate in long guides. The valves are extremely accessible for grinding. The rocker arms, push rods, valve stems and springs are enclosed by a ventilated housing that effectually silences noise. This housing can be quickly removed.

The motor is stated to have unusual efficiency from a given volume of fuel. The cooling is by water circulated by a centrifugal pump through a honeycomb radiator, and by a large fan driven by a flat belt that is adjustable for tension. The lubrication is by oil forced by a pump from a reservoir on the motor case through a sight feed gauge on the dash, and fed by gravity to the crankshaft and the camshaft bearings and to the individual splash troughs under the connecting rod big ends, where it is distributed by splash to the cams, valve tappets, wristpins, pistons and cylinders. The distribution of oil is so thorough that this splash will fully lubricate the valve push rods and rocker arms. The Delco system



The 1915 Oldsmobile Model 55 Seven-Passenger Six-Cylinder Car.

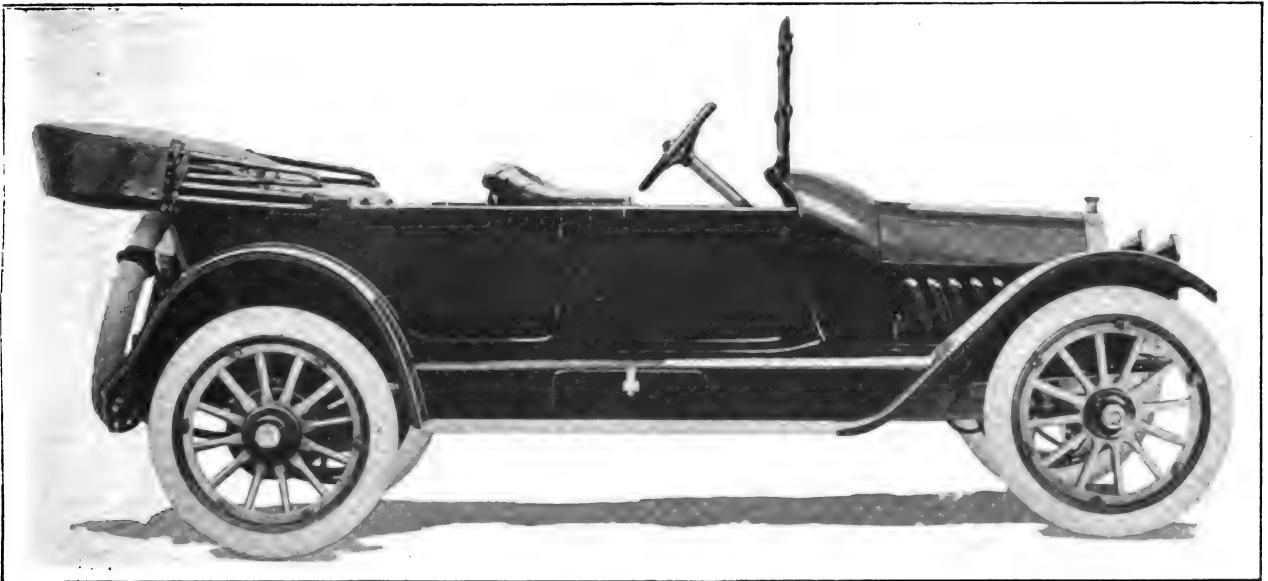
for ignition, lighting and starting is used, this including a motor generator with a distributor in unit. The generator supplies electric current for a storage battery, from which energy for ignition, lighting and starting is drawn, pressing a pedal engaging the pinion and gear by which the engine is started by the motor. The generator will begin charging when the speed of the car is approximately 15 miles an hour.

The clutch is a cone $12\frac{1}{2}$ inches diameter and $2\frac{1}{2}$ inches face, and the selective sliding gearset has three forward speed ratios and reverse. The gears and shafts are large and hardened, and the shafts are mounted in liberal annular ball bearings. The driving shaft is enclosed in a large torsion tube, with a universal joint at the forward end, and the rear end carries the pinion

inch diameter drums on the rear wheels that have $1\frac{7}{8}$ inch faces. The 15 gallon gasoline tank is mounted at the rear of the chassis, the fuel being fed by a pressure of $1\frac{1}{2}$ pounds from an air compressor driven by the motor.

The body is admirably designed, upholstered and finished. The instrument board is under the cowl, with the instruments mounted flush, with carrying compartments at either side. The tool box is concealed in the chassis skirt just above a running board. The equipment is in every way complete.

The six-cylinder car is but slightly different from that built last season. It is equipped with a unit power plant with a motor with the cylinders cast in pairs, these having bore of $4\frac{3}{4}$ inches, and stroke of $5\frac{1}{4}$ inches, the rating by



Side View of the Model 42 Five-Passenger Four Cylinder

that meshes with the master gear of the differential assembly in the three-quarters floating rear axle. The rear axle bearings are annular ball and Hyatt roller; the front axle bearings are Timken. The front axle is an I section steel drop forging. The frame is a pressed steel channel section, well reinforced, that is mounted on semi-elliptic springs forward, and three-quarters elliptic underslung springs at the rear. The wheels are shod with 34 by four inch tires.

The steering column is at the left side, the control being with the usual pedals for motor starting, clutch and service brake, spark and throttle levers on the steering wheel, and gear shifting and emergency brake lever at the centre. The service brake bands contract on, and the emergency brake shoes expand within, 12-

S.A.E formula being 43.80 horsepower. The maker claims for this engine 50 horsepower at 1500 revolutions a minute.

The cylinders are an L-head type with water jackets cast integral and with large cover plates secured by cap screws. The crankcase is aluminum, cast in two sections, the upper portion carrying the main bearings. The lower half contains the oil reservoir. The general construction is conventional, but the motor is especially accessible and it is unusually well finished. The cooling is by water forced through a honeycomb radiator by a centrifugal pump, and the lubrication system is the same as that described for the four-cylinder engine. The carburetor is an automatic float feed type. Motor starting, ignition and lighting are by a Delco system.

IN THE COMMERCIAL VEHICLE FIELD.

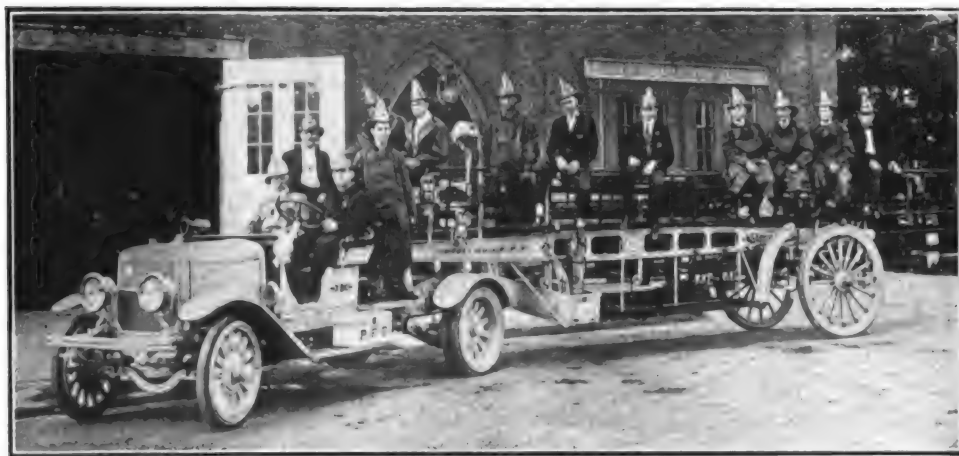
KisselKar Fire Truck and Trailer Give Excellent Service—Hartford Electric Light's Electric Battery Exchange Service—Brown's Material Distributor.

A KISSELKAR truck, made by the Kissel Motor Car Company, Hartford, Wis., is giving excellent service in the fire department of Patchogue, N. Y. It is a four-wheel, 1½-ton machine, provided with a patented turntable. While it may be attached to any type of horse drawn vehicle, it is, in this case, used to draw a hook and ladder trailer.

The motor, a four-cylinder, water cooled, L. head type, with cylinders cast in pairs, is of standard design, and has the valves placed on one side, which operate on a single camshaft. The water jackets are cast integral, and the cylinders are large and so designed that cool water enters the hottest part of the motor.

neto shaft.

The clutch is the leather faced cone type, with an extra wide face setting deep into the flywheel. Transmission, which is hung amidships on the same sub-frame that supports the motor, is the selective sliding gear type, with four speeds forward and reverse, the direct drive being on the third speed. The differential, which is extra large, may be locked by means of a pedal at the driver's feet. This device, which the company states is an absolute necessity on this type of machine, permits the power to be transmitted to one wheel in case a chain breaks, or to both wheels alike should one wheel drop into a hole or strike an icy pavement or mud hole.



KisselKar Fire Truck and Trailer, Which is in Use in Patchogue, N. Y., Fire Department.

Lubrication is by pump and splash, oil being forced by a gear driven pump into the splash basin and to all parts of the motor, the surplus draining back into the reservoir, which is formed by the lower half of the crankcase. Ignition is by a Bosch high-tension or Mea magneto, dual system, a coil with double-throw switch and a starting button mounted on the dash or igniter system. A float feed type of carburetor, with automatic auxiliary air intake and water jacketed chamber, is used. Cooling is by a positive circulating system actuated by a centrifugal pump on the same shaft that operates the magneto. Behind the radiator, which is of the honeycomb type, is a fan driven by a flat belt from the mag-

neto shaft. The clutch is the leather faced cone type, with an extra wide face setting deep into the flywheel. Transmission, which is hung amidships on the same sub-frame that supports the motor, is the selective sliding gear type, with four speeds forward and reverse, the direct drive being on the third speed. The differential, which is extra large, may be locked by means of a pedal at the driver's feet. This device, which the company states is an absolute necessity on this type of machine, permits the power to be transmitted to one wheel in case a chain breaks, or to both wheels alike should one wheel drop into a hole or strike an icy pavement or mud hole. Semi-elliptic springs of chrome vanadium steel are used in front and rear, being 38 and 54 inches length respectively. The steering gear is a worm and sector, irreversible type, the entire mechanism being enclosed in an oil tight malleable iron case. The steering wheel carries at its top the conventional spark and throttle lever.

Acceleration is by a pedal control. The service brake is an external contracting type, operating on drums, while the emergency brake is of the internal expanding shoe type, and is operated by a conventional hand lever.

FIRST ELECTRIC BATTERY EXCHANGE.

The electric vehicle battery exchange system began when the Hartford Electric Light Company, Hartford, Conn., established such a system about three years ago. Since that time one other in the United States and two in Germany have come into existence.

The Hartford company inaugurated the sys-

tem primarily to promote the use of electric vehicles, it being the agent for General Vehicle machines in Hartford and vicinity. From the outset the ruling was made that only commercial vehicles were to participate in the battery exchange system, owners of electric pleasure cars being referred to the several local garages that specialized in that work. The originator of the plan, A. C. Dunham, former president of the company, had no precedents to guide him as to procedure or rates of charge during the first days of what was, admittedly, the experiment. Today, two scales of charges are in force, they being based upon the experience of the company. One is for the owner who requires no charging apparatus or garage, the other for the customer who furnishes charging apparatus approved by the company. The service is based on a yearly contract and the bills are made to cover a month. The bills are based on mileage used, which is a factor that appeals to the business man, in that it is something which he definitely understands.

Scale No. 1 is for battery exchange without reference to number used or the time exchanged, and the batteries are taken out of and placed in vehicles at the company's Kinsley street station. No. 2 applies to vehicles in which a battery is charged at the garage of the Commercial Electric Vehicle Company, 1271 Main street, at night, but should there be additional mileage desired another battery is installed at the Kinsley street station at demand.

SCALE NO. 1.

Monthly scale of charges under the Edison battery service system as furnished by the Hartford Electric Light Company, with the General Vehicle Company's standard wagons and trucks. No charging apparatus or garage required:

750-Pound Wagon.			
Fixed charge, per month.....			\$15
Rate per mile..... 0 to 500	2½c		
Rate per mile..... 501 to 750	2¼c		
Rate per mile..... 751 to 1000	2c		
Rate per mile, in excess of....1000	1½c		
1000-Pound Wagon.			
Fixed charge, per month.....			\$20
Rate per mile..... 0 to 500	3c		
Rate per mile..... 501 to 750	2¾c		
Rate per mile..... 751 to 1000	2½c		
Rate per mile, in excess of....1000	2c		
2000-Pound Wagon.			
Fixed charge, per month.....			\$30

Rate per mile..... 0 to 500	3½c
Rate per mile..... 501 to 750	3c
Rate per mile..... 751 to 1000	2½c
Rate per mile, in excess of....1000	2c
4000-Pound Wagon.	
Fixed charge, per month.....	\$40
Rate per mile..... 0 to 500	4½c
Rate per mile..... 501 to 750	4c
Rate per mile..... 751 to 1000	3½c
Rate per mile, in excess of....1000	3c
7000-Pound Truck.	
Fixed charge, per month.....	\$50
Rate per mile..... 0 to 500	6c
Rate per mile..... 501 to 750	5c
Rate per mile, in excess of.... 750	3c
10,000-Pound Truck.	
Fixed charge, per month.....	\$60
Rate per mile..... 0 to 500	7c
Rate per mile..... 501 to 750	6c
Rate per mile, in excess of.... 750	4c

Under scale No. 2 the contract heading reads: "Monthly scale charges, under the Edison battery service system, as furnished by the Hartford Electric Light Company; battery charged in wagon at night, where the customer



This Apparatus Furnishes the Current Used in Charging the 85 Batteries in Constant Service.

furnishes charging apparatus on premises approved by the Hartford Electric Light Company". The scale provides for 750-pound, 1000-pound and 2000-pound wagons, the rates per mile being the same as in scale No. 1. The fixed charges per month vary, however, they being \$10.50, \$14 and \$21 respectively.

The contract requires the company to furnish the customer continuous battery service for use with General Vehicle wagons and trucks in accordance with the schedules stated, and the company to own, maintain and supply all batteries necessary for the operation of the machines, and to charge, install and exchange the batteries. The owner is required to own and maintain the vehicles for which he has contracted

service; to keep them in reasonable state of repair and properly oiled, and to bring the machines to a central location, where suitable apparatus for the rapid exchange of batteries is maintained. The owner agrees to the mileage registered by an odometer furnished by the company as the correct basis for rendering bills, and the company is required to keep the odometer in good condition and shall check the accuracy of the instrument when requested. Further stipulations are provided for between company and customer which are considered equitable, and make for a practical business arrangement.

The company has excellent facilities for the rapid exchange of batteries and for charging. The batteries are kept in a battery room upon timber seats, as shown in the accompanying illustration, and so raised above the floor as to



Battery Charging Room, Showing Timber Seats for Batteries and Charging Apparatus.

admit a Cowan jack, with which the batteries are drawn into the adjoining exchange room. Here the vehicle is driven from a platform set level with the floor and on which are two hydraulic jacks, the vehicle wheels resting in channels. A Cowan jack is run on to the platform, the hydraulic hoist set in operation which raises the jack to take the run down battery in the vehicle. When the jack is carrying the weight of the battery the latches are released, the sides removed and the hoist lowered. Battery and jack are then taken to the battery room, while the new batteries are raised into position by the hydraulic hoist. Two rugged boys can perform the operations, they requiring from 2½ to four minutes to a vehicle, five minutes being

considered a very liberal allowance.

The actual cost of the service to owners has been averaged from records carefully maintained through considerable periods of time. Under scale No. 1 it was found that the battery exchange cost a mile for 750-pound wagon averaged 3.57 cents; under scale No. 2, 3.17 cents; a 1000-pound wagon, 4.46 cents and 3.91 cents respectively; a 2000-pound wagon, 5.25 cents and 4.54 cents; while another 2000-pound wagon averaged 5.51 cents and 4.82 cents.

ROAD MATERIAL DISTRIBUTOR.

The Brown regulated discharge truck body, designed by J. Grove Brown, a mechanical engineer of Groton, N. Y., will, claim is made, practically meet all requirements for accurately distributing the several courses of stone, sand, gravel and similar material used in road construction work. It is said, with this body, a course of stone can be laid by gravity discharge to any determined thickness that will be of equal compactness throughout, save at the laps, where there may, and probably will, be some variance. However, the designer maintains that the trimming necessary is very slight in comparison with that required when stone dumping methods are used. While the truck body and spreading attachment is designed primarily for highway construction work, the machine can also be used in other work, interchangeabil-

ity of standard body types being provided for.

The Brown distributor is unlike the majority of other devices designed for similar work, in its hoisting principles. The body is built of steel plate and with flared sides, which make for comparatively shallow depth and facilitates the discharge of the load at low elevations of the forward end. The five-ton body is but slightly more than five feet above the ground. Elevation is obtained either by power or manually, its operation being shown in the accompanying outline sketch. Behind the driver's seat is a frame, near the top of which is mounted a journalled cross shaft, on which are two drums on which the chains that move the body are wound. The hoisting chains are attached to the end of a

hinged arm that folds beneath the body when lowered, as is designated in the sketch, the arm being carried in a curved track attached to the forward frame. A third chain is attached to the top of the body to prevent the body being overbalanced, the chain being unwound when the body is elevated, and wound when it is lowered. The body has comparatively short overhang.

The sketch illustrates the load being discharged by gravity, distributed and evenly spread, this last being done by a special attachment. The sides, bottom and end gate, the last being pivoting, virtually form a hopper into which the load descends, the discharge being regulated by the end gate, which is controlled from the driver's seat by worm and gear. When the body has been sufficiently elevated, one or more auxiliary wheels contact with the ground, they being maintained in position by two radius rods that are pivoted at either end. Chain stops support the body when it is lowered. The load passes into a telescopic chute, which is attached to the body by pivots and with the auxiliary wheel frame. The chute is the full width of the body, and has a leveling or evening edge which is dragged over the surface, bringing it to exact height. This edge is adjustable to any desired height for practical purposes, and the spreading attachment can be adjusted so that the material can be distributed to a determined depth.

Two different forms of spreaders are designed, one for laying a course of crushed stone, and the other for spreading the top dressing, both having a spread equal to the width of the body. These attachments are removable, when the machines are to be used for other kinds of work, but the end gates and operating mechanism are retained. A special type of chassis is designed to obtain the fullest operating utility of the motor truck in road construction. It has a short wheelbase, with forward wheels that have increased movement, so that they can be turned from 40 to 45 degrees, instead of the usual 30 degrees, which will afford a shorter turning radius, a very desirable quality.

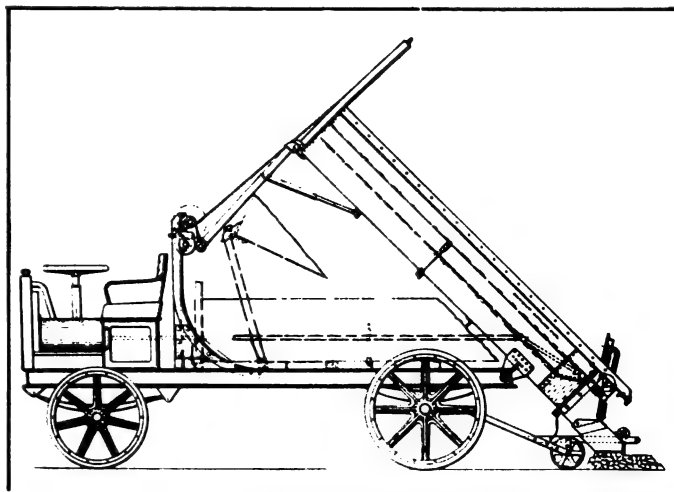
FINE ENGLISH MARKET FOR TRUCKS.

P. D. Saylor, managing director of the Goodyear Tyre & Rubber Company of Great Britain, the Goodyear company's European organization, declares that there is a fine market in England for American made commercial trucks of one and two-ton capacities. "Most of the English trucks

go to the army," he states, "and business organizations have a hard time supplying themselves. The principal difficulty now would be in getting the goods across. Shipping facilities are crippled because the government is using so many ships for army transports, etc. As for Goodyear tires in Europe, I can only say that at no time up to the present have we been able to supply the demand with as much promptness as we desire."

TRUCK EXPORTS INCREASE.

Experts of commercial motor vehicles increased 811 per cent. for the seven months ending with January, 1915, while exports of pleasure cars decreased 53 per cent. for the same period. The total number of trucks was 3,972, valued at \$10,989,442; the total number of pleasure cars fell from 13,553, worth \$12,540,593 for the seven-

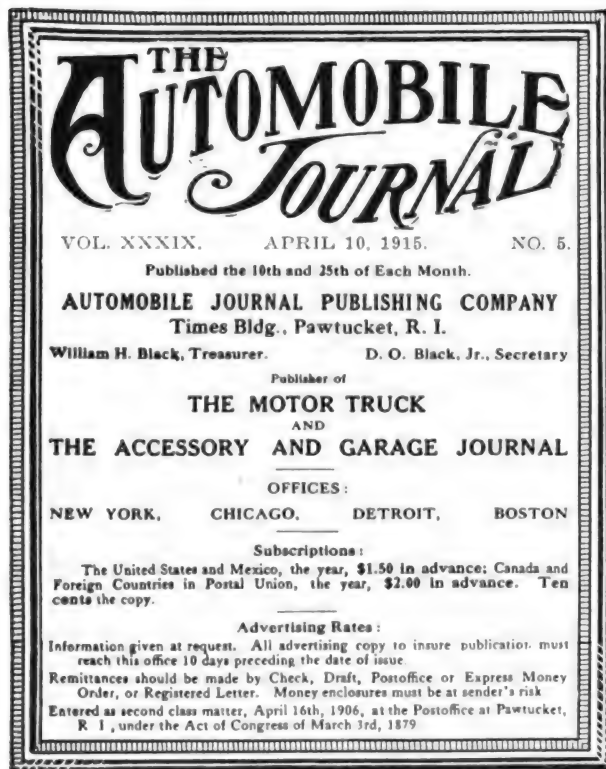


Sketch Showing Operating Principles of the Brown Regulated Discharge Body.

months period of 1913 to 6,904 worth \$5,808,099 in 1914. The increase in truck exports is due largely to the demand by the warring governments, while the financial conditions in Europe is responsible for the decrease in pleasure car demands.

The Monahan Express Company, New York City, is building a fleet of motor cars to handle the parcel post matter in New York, which contract was awarded in open competition and to go into effect July 1. The company will have a station north of 125th street, besides its main depot in Seventh avenue, near 17th street.

So great is the popularity of the "jitney" bus that 15 were sold in Kansas City, Mo., in one week by the Studebaker Corporation.



CONNECTICUT'S TRUCK TAX BILL.

Among the bills proposed this season that have aroused the ire of motorists is the bill before the Connecticut legislature, one of whose provisions is a tax of \$225 on a 10-ton truck that is worth on the average of \$3000, making a rate of about $7\frac{1}{2}$ per cent. Opponents to the bill point to the fact that the railroads of the state are taxed at a rate less than one per cent. on value. A contemporary states, "the general assembly believes that \$490,405,000 worth of railroads ought to pay an annual tax of \$3,714,000. The committee on roads, rivers and bridges want \$490,405,000 worth of 10-ton trucks (a supposed valuation equal to the railroads) to pay \$40,877,000. They want to tax auto trucks more than nine times as much as railroads are taxed. The bill ought to be entitled, 'a bill to prevent trucks competing with railroads in the transportation of freight'".

PROSPERITY.

Whatever lethargy was prevalent in the automobile industry, in both the pleasure car and

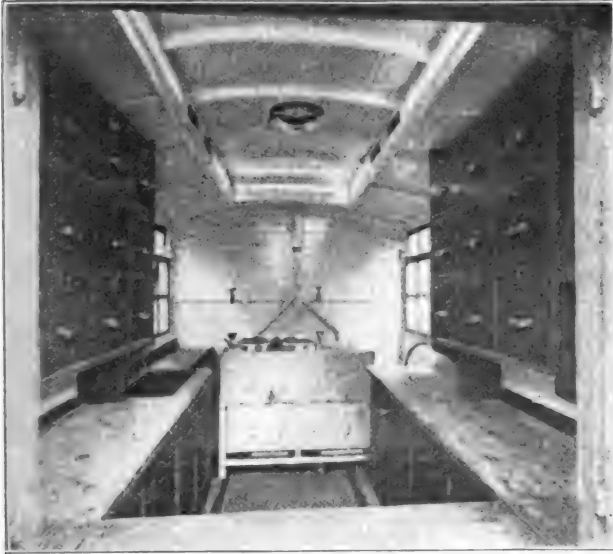
commercial vehicle fields, during the past half year or more, has disappeared today. Reports from the various manufacturing centres indicate that the industry was never in a better condition than it is at the present time. Makers and dealers are almost unanimous in the declaration that during the March just closed more retail sales were made than in the corresponding month in any year. More gratifying to all concerned is the indication that the demand for motor vehicles will continue steady during the entire season. This optimism is based upon many facts, one of which is that many manufacturers have been compelled to change their schedules of production to meet the increased demand and are working their plants in continuous 24-hour shifts. The automobile industry was supposed to have reached its height in 1908 and 1909; but the consensus of opinion is that in 1915 those records will be far exceeded.

THE TOURING SEASON.

Several factors contribute to the making of 1915 the greatest touring season in American automobile history. One of these is the European war, cutting off as it does the annual hieira to those shores of many thousands who are estimated to spend \$600,000,000 in a season. Another, and one of the most important, is the modern automobile itself, which has been brought almost to a point of mechanical perfection, so that the tourists can confidently start out for a jaunt with reasonable expectations of returning on schedule and without mishap. A third factor is the excellent condition of the highways in nearly all parts of the country, especially the great interstate and intercontinental routes. And this season will witness a spectacle, according to present indications, that has never taken place before in this country—thousands of touring parties following the setting sun to the Panama-Pacific Exposition. In previous years the motorist who made the trip was looked upon as a daring pioneer, an isolated case. This year such a trip promises to be a common event, hundreds of owners having signified their intention of either making the journey as a member of one of the numerous touring parties already scheduled, or alone. The four intercontinental routes are said to be in excellent condition.

FEEDING SOLDIERS FROM FEDERAL TRUCKS.

FEDERAL two-ton chassis have a new role for commercial vehicles in the European war in the character of military field kitchens. The



Interior View of the Federal Field Kitchen, Showing Equipment.

vehicle shown on this page belongs to the British Red Cross Society. Its body is very completely equipped with kitchen utensils, etc., and it is said that over 500 steaming, hot meals can be served to as many soldiers within 12 hours. The chassis, known in England as the Whiting-Federal, is the product of the Federal Motor Truck Company, Detroit, Mich., and was supplied to the British Red Cross Society by the English selling agent, Messrs. Whiting, Ltd., London.

The kitchen is roomy and complete to the last detail. The cooking is done on a paraffin burning stove to which is attached a large water boiler with four urns for hot milk, meat extracts, soup, etc. The water is contained in a 60-gallon tank fitted to the roof over the cab, and is so placed that the heat of the stove keeps the water supply from possibility of freezing. The supply is replenished by means of a Wilcox rotary pump which quickly draws water from any available

source, the water being strained through a filter in the cab tank. Further equipment includes a sink with essential fittings, utensils, a cold water supply and spacious drawers and cupboards for food supplies, etc.

A feature that makes this field kitchen distinctive from others in service is that it is equipped with a commercial chassis on solid tires, while the majority of others are provided with a sturdy touring chassis on pneumatic tires. One of these latter is shown in an accompanying illustration and is English made. The manufacturer is James Young & Co., and it was designed for service in the French army. The chassis is an old chain driven Daimler, the back tires having twin tires on Michelin twin rims. The kitchen is equipped with two Primus duplex ranges, together with four boilers for soup, stew, etc. There are also three single Primus stoves with boilers for hot water, milk, etc. One side of the body is so constructed as to make it possible to lower a section which forms a counter on which to serve food.

EXHAUST FUMES SICKEN SOLDIERS.

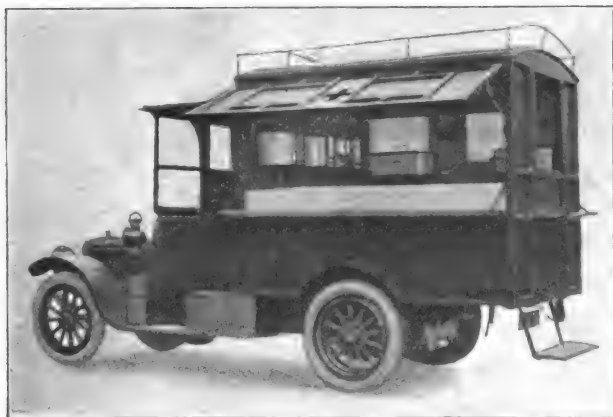
One of the many peculiar developments associated with motor vehicles in war is that the ordinary position of the exhaust pipe is unsuitable on motor ambulances. It has been found that



Exterior View of Federal Truck Equipped as a Field Kitchen in British Army.

when an ambulance full of men is allowed to stand that the fumes from the exhaust come in through the back and top and very frequently

sicken the wounded men. When the car is in motion the atmospheric displacement of the large vehicle top is very great and serves to draw the



English Built Field Kitchen Mounted on Daimler Chassis, Showing Side Lowered.

fumes into the van. Consequently motor ambulances for service at the front are now being equipped with the exhaust turned out sideways just in front of the right rear wheel, similarly to the sand pipe on a locomotive.

BRITISH AUTO SHOW ABANDONED.

Owing to suspected lack of interest in automobile shows, and the inability to gather a representative showing of vehicles, both factors being attributed to the European war, the proposed motor vehicle show to be held April 16-24, in the Ice Palace, Manchester, England, was abandoned by a majority vote of the directors of the North of England Motor Shows, Ltd., at a recent board meeting.

Paris is recovering to some extent from the effects of war upon its omnibus service. Although the French army still retains a large proportion of the vehicles seized at the beginning of war, the omnibus companies have succeeded in obtaining others and are resuming most of the principal routes of service.

AERIAL SCOUTS IN AUTOMOBILES.

The power of an automobile engine is being utilized in the European war in many peculiar ways. One of these, in the French armies, is illustrated in the accompanying photograph, wherein can be seen a military observer suspended in midair by a series of man-lifting kites and the automobile that brought the apparatus and

men to the grounds and was utilized to send the soldier aloft. The vehicle equipment consists of a substantial automobile and a light trailer and affords sufficient room to carry a number of men and the full kite equipment.

The method of operation is as follows: The first series of kites is sent up, and to these is connected a wire cable on which a sort of a small trolley with a basket car attached can be run. A second series of kites draws up the trolley, and the two series of kites are controlled by the engine power of the car through special winding drums that keep the cables taut, or can pay out or draw in as is desired. One feature of the arrangement is that the cable can be drawn in at the rate of 600 feet a minute, which is a decided advantage when the enemy's guns suddenly are turned upon the observer. Another advantage is that a sufficient air pressure is concentrated upon the lifting surfaces of the kite to prevent a sudden fall.

The car shown in the illustration is the French made Delahaye, of 24 horsepower, has an average speed of from 12 to 15 miles an hour, and



French Military Observation Motor Car Operating Its Kite Equipment.

has the power to draw a trailer carrying about 2500 pounds. When loaded the car weighs about two tons.

HEADLIGHT REGULATIONS.

Headlights that give off a glaring light will be banished from the highways of the nation, if the several state legislatures, civic and automobile organizations throughout the country that are working for such reforms can have their way. It is a movement that will receive co-operation from most motorists, for it will eliminate a large factor in the numerous accidents that happen on the roads.

Manufacturers of lighting systems and automobiles have anticipated this general movement by providing equipment in which the lights can be turned low, or by completely extinguishing the headlights and using an auxiliary set of side lights that give sufficient light for the driver and do not create a glare that blinds the on-coming motorists, pedestrians or drivers of horse vehicles.

Ordinances already exist in several large cities requiring the dimming of lights, and many other municipalities are urging legislation. One of the latter is Worcester, Mass., while in Providence, R. I., recently the city solicitor was directed by resolution to advocate the passage of any legislation proposed in the General Assembly providing for the shadowing or dimming of headlights on motor vehicles while operated on public highways within the "15-mile speed limit."

FERRIES WEIGH ALL AUTOMOBILES.

The new Erie ferry schedule of rates for automobiles between New York City and New Jersey is based on a weight and length basis for passenger automobiles. A platform scale is located at the entrance to the ferry, and the following rates will be charged: Automobiles, passenger, up to and including 1500 pounds and 11 feet in length, 35 cents. Each additional 2000 pounds or fraction thereof, five cents. Each additional two feet or fraction thereof, five cents.

Each passenger, in addition to the driver, costs three cents in addition to the charge for the car. Inasmuch as the passengers must be weighed in the car originally, it would seem that the Erie is exacting double toll in this respect. This new schedule makes this the highest tariff between New York and New Jersey.

PROPOSED TAX MEETS OPPOSITION.

Vigorous opposition is being made to bills in the Pennsylvania Legislature that are intended to increase the tax rate upon automobiles and

motorists. Individual machine owners, represented by E. J. Kent, the Pittsburg Automobile Club, and the Pennsylvania Motor Federation are organizing a campaign to defeat the legislation. A bill that would allow second class cities to tax automobiles was vigorously opposed by Mr. Kent, he stating that it was against the Pennsylvania constitution.

Robert P. Hooper, president of the Pennsylvania Motor Federation, stated that inasmuch as autoists already pay a state tax it would be unfair if the city of Pittsburg asked that an additional tax be imposed. Mayor Armstrong, of Pittsburg, who is urging the tax measure effecting second class cities, said that revenues of his city had fallen off considerably because motor vehicles were replacing other taxable vehicles. He stated that it cost 40 cents a square yard more for paving that will stand the wear of heavy trucks and give the kind of streets motorists insist upon having.

PROTESTING FREIGHT INCREASE.

Manufacturers of automobiles are protesting through the National Automobile Chamber of Commerce against the efforts of the railroads to increase the rating on pneumatic tires in carloads from third to second class. It is felt that any additional increase would be unfair, especially in view of the decreased value of tires as compared with the values when the third class rating was fixed.

MICHIGAN LIGHT BILL DEFEATED.

A bill in the Michigan legislature designed to compel all vehicles to carry lights visible from the front and from the rear was defeated by the House of Representatives, after it had been passed by the Senate. The representatives from the rural districts opposed the bill, claiming that it was unfair to their constituents. A proposed amendment that would exempt farmers failed to win the opposition to its passage.

CALIFORNIA LEGISLATION.

Recent legislation in California provides for the following: License plates need not be changed each year, but a small disc will be attached indicating the year. This is expected to save \$40,000 a year. All vehicles, whether motor or horse-drawn, shall carry a light after dark. Speeders, after a second conviction, shall lose their licenses for six months.

CAR ACCESSORIES AND EQUIPMENT.

ALBEX FOLDING GOGGLES.

Willson & Co., Making a Self-Adjusting, Perfect Fitting Eye Protection for Motorists.

T. A. Willson & Co., Inc., Reading, Penn., is marketing the Albex folding goggles, formerly known as the Zybex, which is designed to fit any face snugly, and still give perfect ventilation. The self-adjusting bridge, made of strong, silk braid, automatically conforms to any shape of features and clings so closely as to exclude



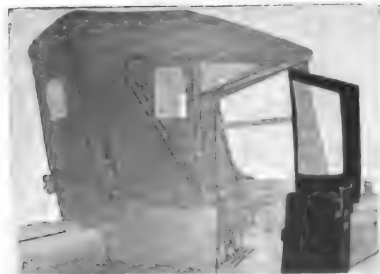
Self-Adjusting Eye Protectors.

dangerous dust laden air. The folding leather sides are soft and pliable and well ventilated. The temple cables are full and flexible and cannot pull or bind. The goggles are made with flat, ground and polished, optically perfect lenses, and are supplied in either clear white, amber, flouzal, smoke or amethyst colors, the manufacturer recommending amber or flouzal. The goggles can be folded and carried in a handsome genuine seal grain leather case, that is included in the price of \$2. It is stated that more than 100,000 motorists are now using these goggles. The complete line carried by the Willson company consists of the goggles mentioned, style G 1, the Albex night and day goggles, style G 1½, and the Albex folding goggles for ladies and children, style G 11. Style G 1½ sells for \$2.50, and style G 11 for \$2. Further particulars can be obtained by addressing the T. A. Willson & Co., Inc., Reading, Penn., and mentioning the Automobile Journal.

JITNEY CURTAINS FOR ALL CARS.

An Equipment That Will Eliminate Buttons and Afford Instant Egress or Ingress by a Door.

The Jitney Curtain Company, 30 N. Ludlow street, Dayton, O., is making curtains that are equipped with the Blackmore curtain opener, that are sold under the trade name of "Jitney Curtains."



Runabout Equipped with Jitney Curtains.

The company claims that these curtains will afford the greatest convenience to the user, because there are no buttons to be unfastened when one wishes to enter or leave the car. All that is necessary is to open the door and the curtain will swing with it. A bracket supports the curtain at the door edge, so that it can be opened or closed with the door. This makes the open car with top and side curtains as convenient for the passenger as is the limousine. The company states that this curtain opener has been used, because of the many un-

usual qualities, at an increase in cost, on the 1915 models of Packard, White, Cadillac, Chalmers and Hupmobile cars. The company is confident that many more prominent firms will include them in the equipment of their cars.

These curtains are especially desirable during the winter months, as they will convert any touring car into a vehicle as comfortable as a limousine, but they also are equally convenient whenever curtains are required. The equipment practically incorporates the curtains into the doors and they are conveniently attachable and detachable. The curtain openers can be adopted to any machine and tops now in use may be converted at a trifling expense by any top maker. They are not unsightly and their utility is such that they are very generally demanded. The equipment is sold at retail for \$1.50 a door curtain, and liberal discounts are made to dealers and top makers. Garage men and accessory dealers who are interested in a fast selling equipment should communicate with the company, mention the Automobile Journal, and obtain literature and information as to prices, etc.



Jitney Curtains as Used on a Touring Car.

UTILITY AUTOMOBILE WRENCHES.

Five-Piece Socket Type Tool That Has Special Qualities for Working in Inaccessible Places.

The Hill Pump Valve Company, Chicago, Ill., is manufacturer of a five-piece socket wrench set which it claims has all the qualities of other sets of 14 pieces or more,

as well as some that they do not possess. The wrenches are simple in design, and adjustment to the different sizes of nuts is made immediately, as there are no screws to manipulate. A strong claim made for this wrench is that it will fit hexagon, square, wing and cock nuts, and that it will not bruise or round the corners.

All that is necessary to start a nut is to place the wrench over it and by pushing down the socket on the jaws or clamps, the wrench becomes self-adjusting. It is claimed that once the wrench is set, it will not loosen and in removing the nut the jaws hold it so firmly that it cannot fall and become lost. In replacing the nut, it can be set in the jaws and applied to the bolt or screw. The jaws have an even gripping power on four sides and cannot slip and injure the fingers of the workman, because the harder that one pulls, the harder the jaws will bind.

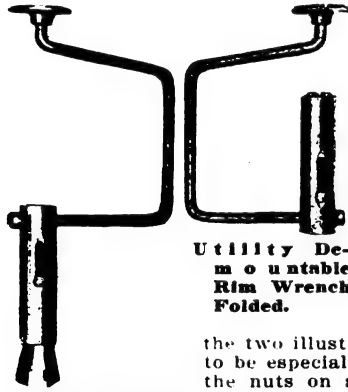
These wrenches should become generally used in garages and by car owners on account of their time saving



Utility Socket Wrench Set.

CAR ACCESSORIES AND EQUIPMENT.

qualities. They will fit all the nuts that are used in automobile work and are very handy for removing nuts on demountable rims. The set consists of three wrenches and two lever rods and are warranted to grip all nuts from 3/16 inch to 1/2 inch inclusive. The wrenches come in three sizes, being seven, six and five inches length respectively. The complete set, as shown in the accompanying illustration, comes packed in a neat canvas bag and is sold for \$2.50.



Utility Demountable Rim Wrench Folded.

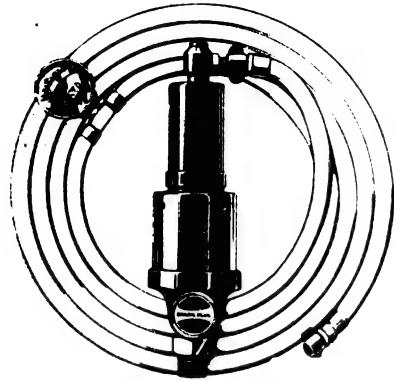
Utility Demountable Rim Wrench.

When not in use the wrench can be folded so it may be conveniently carried in a tool kit or box. The retail price is \$1.50.

MAYO SPARK PLUG PUMP.

Made in Several Types That Can Be Used at Will or Attached Permanently to the Motor.

Among the many accessories for automobiles made by the Mayo Manufacturing Company, Chicago, Ill., is a spark plug air pump that is adaptable for any four-cycle motor of two, four or six cylinders. It is guaranteed to pump nothing but pure, fresh air, and its use for tire inflation cannot damage a tire. The pump can be attached to an engine cylinder by simply removing a spark plug and screwing the pump in its stead. It is not necessary to use a wrench for this operation, the hands being sufficient to install it. After fastening it securely in the cylinder the hose is connected and the motor started at low throttle, and run slowly until the tire has been sufficiently inflated.



Mayo Spark Plug Pump.

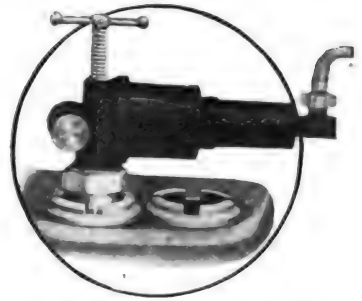
The maximum pressure that is afforded by this pump is 150 pounds. There are no parts to be adjusted, so is absolutely fool proof. The only care that it requires is an occasional drop of oil.

The principle of operation is similar to that of any cylinder pump, there being a small piston with rings which has a suction and compression stroke. When the piston is drawn down it takes in air and when forced upward it forces it into the tire. This piston is dependent on the strokes of the engine cylinder piston for its operation, but if the engine is raced it will automatically lock itself. The pump is 10 inches in length and 2 1/2 inches in diameter and weighs about 2 1/2 pounds. Each pump is tested on a four-cylinder engine before it leaves the factory.

It is finished in black enamel with polished brass parts, 12 feet of superior hose and pressure gauge, with connections and adapter to fit any car, complete the set. The retail selling price is \$10.

A Mayo Quick Detachable Spark Plug, which is sold for \$1.50, will add greatly to the convenience of the motorist who uses this outfit. This plug is made in two parts. The upper part is the plug proper and fits into the lower part, which is an adapter that is fitted permanently into the cylinder. Two slots are milled inside the adapter, and into these the spark plug proper fits and is locked in place by a quarter turn of the handle when in use. The pump can be fitted in a few seconds when one of these plugs are used.

All that need be done is to give the handle a quarter turn and take out the ignition plug proper and insert the pump in its place. When in position, by giving the handle a quarter turn it is locked stationary. The porcelain of the plug cannot be easily broken, as it is fully protected. An adapter can be installed into any convenient valve cap on the top of the motor should there be any reason for not using a spark plug hole. A dummy is supplied to fit into the adapter when the pump is not in use. The adapter and dummy, with pump connection, are sold for \$1.



Mayo Valve Cap Pump, Permanently Attached to Motor.

HOGGSON POCKET TIME STAMPS.

Recorders That Can Be Used in Garages and Service Stations with Large Economies.

Since the days of the Hinchman patents, which were known favorably in 1873, many time stamps have been produced which have not been entirely satisfactory, because of complicated construction, or because of faulty design or workmanship. S. H. Hoggson Company, Thames building, Thames and Greenwich streets, New York City, is the manufacturer of time stamps which are claimed will meet all requirements and endure in all services. S. H. Hoggson invented these stamps. He worked in his father's factory and in 1889 began the manufacture of electric time stamps in St. Louis. At the world's fair in Chicago he was awarded a diploma and medal, the judges making a special classification for him. After experimenting for many years, in 1897 he built a time stamp that could be carried in the pocket and yet have a capacity of several thousand impressions in a day. Since then these little stamps have been used in many classes of business with much success. It will be noted that Mr. Hoggson has had an ex-



Model D Hoggson Time Stamp.

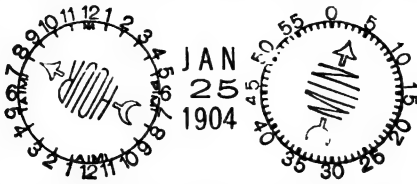
cess. It will be noted that Mr. Hoggson has had an ex-

CAR ACCESSORIES AND EQUIPMENT.

tensive experience in the making of stamps.

The Hoggson stamps should be particularly useful in garages and repair shops. They can be used to record the arrival or departure of cars and persons. They are equally useful to record the time of workmen; the time telephone calls are made, and

invoices may be stamped, so that the exact hour of their receipt is always known. There are many other uses for which the time stamp can be made useful. The Hoggson

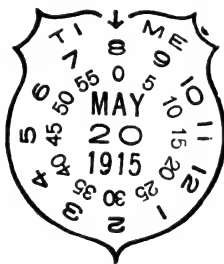


Impression of Model D Hoggson Time Stamp.



Model Shield Hoggson Time Stamp.

stamps are made in three types, that are known as Model D, Model S and Model Shield. Model D, which is shown in an accompanying illustration, is 3½ inches in height and shows the face of the clock. By pressing on the knob at the top, an impression of two dials is made, which indicates the time and the date between them. The left dial is divided into 24 hours and the right dial into 60 minutes. An illustration shows an impression made by this clock, which reads 8.03 P. M., Jan. 25, 1904. Model S is the same design as the Model D, but it prints the date and time within an inch circle, surrounded by a shield. This stamp is spaced for 12 hours and should be sufficient for the average working day. The shield stamp and its impression are also shown. The model shield prints the same as the Model S, but is much smaller and does not show the clock dial, as the time can be readily read from the shield at the bottom. In instances where it is desirable, decimal minute dials will be furnished for the stamps, so that the fractions of an hour may be computed mentally and instantly. The price of the Model D is \$15 complete, with set of dates and ink pad, with any desired inscription on the die plate. The shield stamp complete, with set of dates and ink pad, either plain or inscribed, is sold for \$5. If special inscriptions are required there is an extra charge of \$1.



Impression of Model Shield Hoggson Time Stamp.

BEARTONE FAN HORNS.

Mechanical Warning That Is Operated by Pressing a Button and Is Proof Against Tampering.

After making fans for many years for the Continental Motor Manufacturing Company, and the manufacturers of Paige, Marmon and other well known cars, the Oakes Company, Indianapolis, Ind., has produced a fan horn which is operated simply by the revolving of the fan. This is a novel device and should interest many owners. The operating principle of most electric horns is a revolving ratchet striking on a diaphragm. When the button is pressed an electrical circuit to an electric motor is completed and this motor revolves the ratchet and vibrates the diaphragm. Of course there are wires and contacts that must be maintained in perfect relation.

The Beartone fan horn was designed with the inten-

tion of simplification that would obtain the effect of an electric horn without using electric current. Instead of a revolving ratchet and a stationary diaphragm this device has a stationary ratchet and a revolving diaphragm. As the automobile fan is always revolving, the diaphragm is attached to the front of the fan hub.

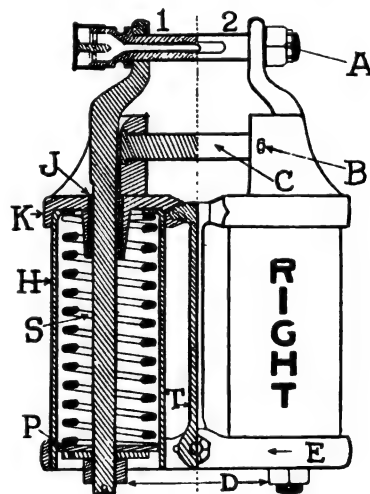
The ratchet is fastened securely to the fan spindle. Pushing a button pulls a cable that operates a lever on the fan and the ratchet wheel is pushed against the diaphragm, causing a clear baritone sound. When the engine is stopped the horn cannot be operated, so it cannot be operated or damaged when the car is left idle in the street. The fan and horn are made as a unit and can be interchanged with any existing fan in a few minutes. The fan is guaranteed to be made of first class material and workmanship, while the horn described above is claimed to prevent back pressure.

By pressing lightly on the button a soft, pleasing sound is made, but by pressing hard, a long reaching tone is produced. The company is making a type for Ford cars which, complete with all necessities, is sold for \$7. The company is making models for other makes of cars. Inquirers who write, mentioning the Automobile Journal, will be supplied data, prices, etc.

THE RIGHT SHOCK ABSORBER.

Simple Spring and Cylinder Type That Is Specially Designed for Medium Weight Cars.

The Right Motor Specialty Company, 1322 Michigan avenue, Chicago, Ill., is manufacturing a shock absorber that is designed for use on medium weight cars ranging



The Right Shock Absorber, Half Sectional View.

from 1800 to 3200 pounds. It is of the twin-cylinder spring and piston type. The cylinders are made of steel and are forced into the heads "K", being retained by the pressure of the coil springs, which are seated against the offset cylinder tops. The sectional sketch clearly illustrates the action of the device. A long piston rod passes through the hardened steel bushing "J" into the cylinder. The end of the rod is fitted for the piston and the rod end is threaded and an adjusting nut is fitted. The spring and piston

are retained by the adjusting nut. A large coil spring is mounted concentric to the rod and it is compressed between the cylinder head and the piston. This spring is made of a fine quality oil tempered alloy steel and is warranted against breakage for life. At the lower end of the piston rod is the piston "P", which is made of vulcanized fibre and is self lubricating. This piston has a stroke of two inches, which is ample to afford a resilient action under a heavy or a light load. Adjustment to load and road conditions is made by turning the adjusting nut to increase or lessen the compression of the spring as the conditions require. No grease is necessary in the cylinder, an occasional application of oil or graphite to the rod at the bushing affording ample lubrication.

CAR ACCESSORIES AND EQUIPMENT.

The absorbers can be attached in 30 minutes. They are fitted in an upright position, the piston rods being bolted to the lower half of the rear spring and the cylinders are fastened to the upper half. Special steel bolts are provided for attaching the absorber to the spring. Provision is made for spring eye lubrication.

The company is selling a set of these absorbers, complete with all fittings, for \$15, with the understanding that the full price will be returned if satisfaction is not given after a trial of 10 days.

PROTECTION OF COOLING SYSTEMS.

Nip Rust Guaranteed to Prevent Conditions That Impair the Efficiency of Circulation and Radiation.

It is known of all that if water is allowed to remain in retainer of almost any metal for a period of time, that the metal will rust. This fact is true of the water



Nip-Rust to Protect the Cooling System.

To prevent rust and scale and precipitation and insure a good circulation, the Reflex Ignition Company, 211 High street, Cleveland, O., is making a solution which it claims will remove rust and scale regardless of its long standing and prevent further formation. The company sells this fluid under the trade name of Nip Rust, and as proof of its efficiency it is offered to the public in tin cans. When the water is first treated, a two-ounce cup, that is supplied with the outfit, should be filled with the solution and the fluid poured into the radiator once a week. After two weeks' use the water should be drawn off and the entire system flushed with fresh water.

To obtain the best results the water should be drained off monthly thereafter. When alcohol and other anti-freezing solutions are used in the winter time there is a probability of corrosion, but if Nip Rust is used, claim is made that it will prevent this. The solution is warranted not to injure the rubber connections or whatever bright surfaces it may come in contact with. The price of Nip Rust as sold is \$1.50 a can, and enough is supplied for this cost for a year's usage. It can be bought only through the maker.

DEFENDING GRAPHITE AS A LUBRICANT.

Joseph Dixon Crucible Company Maintain That the Right Goods Are Unequalled for Same Work.

The result of a rigid investigation conducted by the police board of a southern city was the finding that a cheap grade of graphite grease was being used in the gear boxes of the department's machines that had been

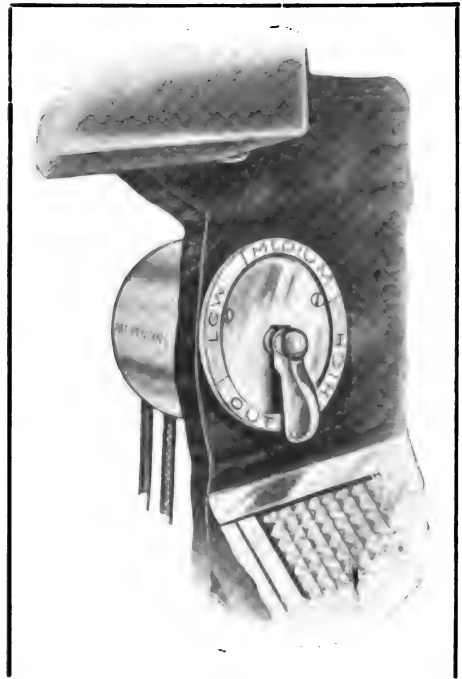
disabled in service. After this inquiry all graphite lubricants were forbidden for the police machines, temporarily at least. In many more instances where damage from faulty lubrication has resulted, the cause has been attributed to the graphite lubricant used, and many have been led to believe that graphite is not an efficient lubricating agent. The Joseph Dixon Crucible Company, Jersey City, N. J., is making a vigorous protest against these unfounded suppositions. The company points out that there are many kinds of graphite. Some is suited for crucibles, other grades for paint, polish or foundry facing, but only one or two grades are suitable for lubrication. The company admits that damage can be done to machinery if a low-grade that contains grit is used, but it also declares that the purchaser himself is negligent in that he has the right to investigate the grade that he purchases. Graphite is a natural product and in its pure form contains fundamental qualities that are difficult to improve. Statement is made that thousands of expensive and finely finished machines are being operated more satisfactorily with graphite than is possible with any other lubricant. The company produces a high grade of graphite grease which is guaranteed to lubricate with satisfaction and economy and is free from all substances deleterious to metals.

CHANNEY HEADLIGHT DIMMER.

With It a Driver Can Regulate Electric Headlights From the Instrument Board by Controlling Lever.

The laws and ordinances requiring headlight dimming in city driving, are increasing very rapidly, and the dealer who sells a practical dimmer that can be adopted to all cars, has something worth while for the motoring world.

The L. F. Channey Company, Springfield, O., is manufacturing an automobile headlight dimmer that is claimed to answer every requirement. It is thoroughly proven, it can be installed by an owner, and it is long enduring equipment. The trade in cities prohibiting the use of glaring lights will do well to investigate the merits of the Channey headlight dimmer shown in an accompanying illustration.



The Channey Headlight Dimmer.

One of its desirable qualities is that with it the driver can graduate the intensity of the lights with a minimum of effort, as the control lever is located on the dash and can be operated by a touch. The Channey dimmer is broadly guaranteed. It is moderately priced and the discount to the trade is liberal. Complete details and prices will be supplied upon request.

CAR ACCESSORIES AND EQUIPMENT.

MIDGLEY STEEL AND RUBBER TIRES.

Lancaster, O., Company Making Composite Tread Shoes That Do Not Skid Under Any Conditions.

The Midgley Tire and Rubber Company, Lancaster, O., is now marketing its new wire tread tires. The company is producing a tread that will, according to its officials, obviate the use of chains on tires. The Midgley composite tread is of steel and, as may be seen from the accompanying illustration, is a studded type. The company exhibited these tires at the recent Boston show, and from the interest shown by owners and the orders received from dealers, there is belief that the tire will meet the approval of the motoring public. The company invites all dealers and distributors to write for full information. Harry Davis is president of the Midgley Tire and Rubber Company, Thomas Midgley first vice president and general manager, and Henry Plow second vice president and sales manager. A letter addressed to Sales Manager Plow will bring the inquirer complete details of the company's selling plans, territory open, trade discounts, etc. It would be well to mention the Automobile Journal when writing to Mr. Plow. The company will extend its fullest co-operation to distributors, and has made provision for liberal profits to those who handle the Midgley tires which, the company is certain, will be in big demand by owners.

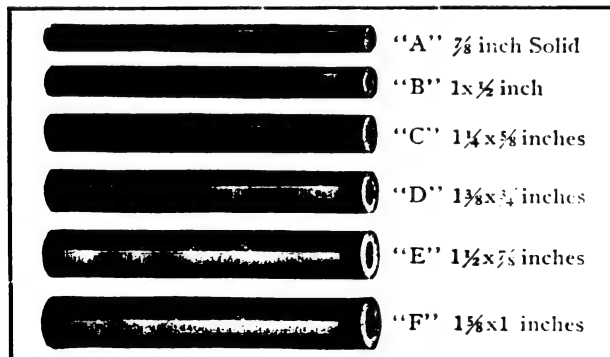


Midgley Wire Tread Tire.

AMERICAN BRONZE COMPANY.

Berwyn, Penn., Company Offers a New Assortment of Non-Gran Cored Bars for Bushings.

The American Bronze Company, Berwyn Penn., is now producing for the trade of dealers and jobbers a special assortment of its Non-Gran cored bars for bush-



Complete Line of Non-Gran 6-54 Cored Bars for Bushings.

ings. The sizes included will make bushings to fit any shaft diameter up to 1 $\frac{1}{4}$ inches. These bushing bars, six in number, are shown in the accompanying illustration, and are known as the 6-54 assortment. By using these bars the repairman will require less stock than is



How the Non-Gran 6-54 Assortment Is Shipped.

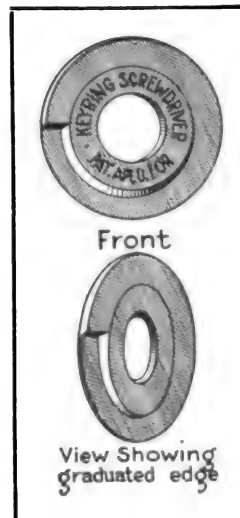
now necessary with other material. The assortment is not expensive, a special price of \$9.69 being made to the trade, which is 47 $\frac{1}{2}$ cents a pound. The company has established new low prices on standard and near-standard size Non-Gran cored bars. Through manufacturing economies Non-Gran cored bars are now sold at 52 $\frac{1}{2}$ cents to the trade. This price is net, as the list price is 75 cents a pound. A 30 per cent discount has been made on all standard and near standard sizes, which brings the price to 52 $\frac{1}{2}$ cents. By addressing the American Bronze Company, Department M, the dealer, jobber or repair man will receive full details of the company's stock, prices, discounts, etc. The six different size Non-Gran bushing bars make 54 standard and all intermediate bushing sizes; hence the name of the assortment 6-54. They are used by many of the leading manufacturers, and are highly indorsed by their users.

NEW POCKET SCREW DRIVER.

Philadelphia, Penn., Company Manufacturing and Marketing a Handy Pocket Screw Driver.

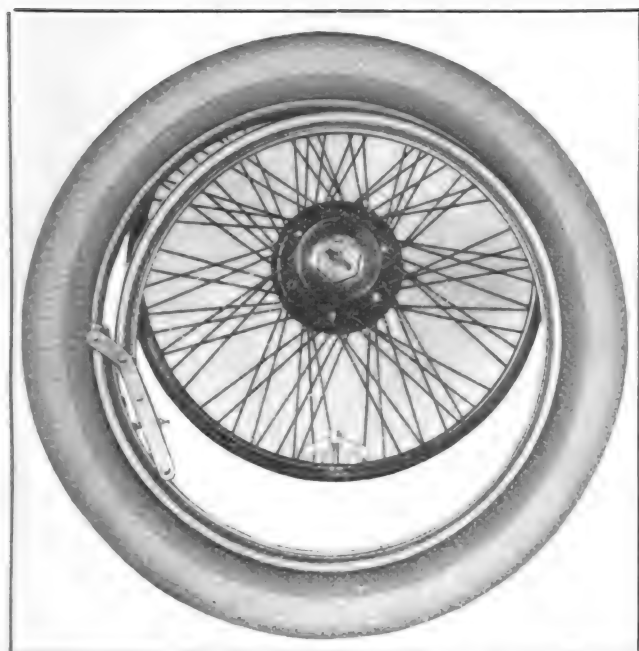
Hess & Son, Philadelphia, Penn., recently placed in the market a unique screw driving device that, while entirely different from standard forms, affords all the service of any ordinary screw driver, while its convenience should appeal to motorists particularly. It is disc shaped, as is shown in the accompanying illustration, and is no larger than a 25-cent piece. Its rim is of a graduated thickness, so that the tool will fit almost any screw head, thus removing the necessity of carrying around numerous bulky screw drivers to fit screws of varying sizes. Its utility is obvious, and its convenience is emphasized by the fact that it can be carried on a key ring or in the vest pocket.

Not only is this unique device a decided convenience to the car owner, but the dealer and garage men will frequently find it of great service in working around a machine. It is not only designed for automobile work, but can be used in the home, the office and the factory in a score of different ways. Being made of tempered steel, it will withstand exceedingly great strains without the edge turning or being nicked, and it will last practically forever. Its low price makes it attractive to everyone. This handy pocket tool may be obtained at the rate of 10 cents each from the manufacturer, Hess & Son, 1031-33 Chestnut street, Philadelphia, Penn., and by mentioning the Automobile Journal when writing.



THE "G R C" QUICK-DEMOUNTABLE RIM.

THE demountable-detachable automobile wheel and tire rim manufactured by the General Rim Company, Cleveland, O., contains several unusual features. In this rim all nuts, bolts, wedges and other loose parts usually associated with that type of tire are eliminated, and the weights of components are so distributed as to reduce to a minimum that hammer blow effect to which F. Hughes Moyer, general manager of the company, calls attention. He points out that even the comparatively insignificant weight of the tire valve, if unbalanced, produces a hammer



G-R-C Quadruple Spoke Lacing Wheel, Showing How Tire Is Demounted and Detached.

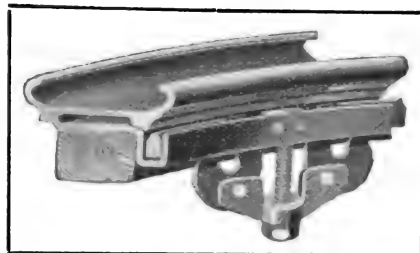
blow that reaches considerable magnitude when driven at high speed. An eight-ounce valve on a vehicle speeding at 90 miles an hour attains a hammer blow equivalent to 150.3 pounds; at 60 miles an hour it is estimated as 66.7 pounds; and at 30 miles a blow equal to 16.66 pounds.

This continual hammering on the road surface has a very damaging effect upon the tire casing, deforming its original shape, setting up internal strains between the plies of the fabric, and heat is generated which has a serious effect upon the tire, which weakens and fails after covering a few thousand miles.

To overcome this hammering, the "G-R-C" rims are so constructed that the weight of the locking device, which operates the demounting

and detaching mechanism, hereinafter explained, counterbalances the weight of the valve and reduces the blow to a minimum.

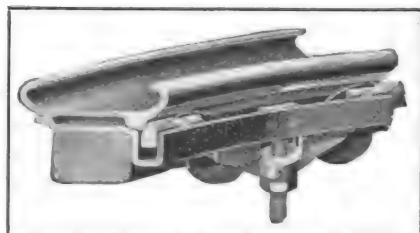
The rim is very easily demounted and detached, it requiring about 15 seconds to lock or unlock the rim around its entire circumference



Locking Device Rim in Locked Position, Ring Expanded.

by a toggle device. An expanding ring, located in a groove forming the front portion of the wheel, attaches the tire-carrying rim to the wheel band. This ring, which is expanded and contracted by means of a toggle device operated from a single point, engages the front surface of a supporting bead, on the underside of the rim. The wheel band and ring are assembled as a unit, and when applied to wheels there are no other parts to be considered, except the tire-carrying rim. The last named consists of a single piece section (either clincher or straight side interchangeable on the same size wheel band), cut transversely at one point, the cut or split being joined together by a clip attached to the underside of the rim and on one side of the split, the clip having its opposite end upturned to engage a slot on the other of the split. A swivelled lever engages the clip, which locks the rim in its circular shape when the rim is in its closed position.

The rim is supported around its entire circumference by the wheel band, including the portion at the split. The ends of the rim at the split are supported and lined up by means of the wheel band and expanding ring, making a smooth joint, which cannot injure the tire, as is shown in the accompanying illustration. The



Rim in Unlocked Position, Ring Contracted.

side flanges of the rim are drilled to receive the single acting rim tool that contracts the rim for the removal of the tire and automatically locks

the rim in position to receive the new tire. The bead on the clincher tire is protected from cutting by the use of long pins on the clincher rim tool, which are forced under the bead.

A set of rims consists of four wheel bands assembled complete with expanding ring and locking device; five tire rims, one detaching tool and one ratchet wrench for operating the locking device.

The General Rim Company is also manufacturing a new wire wheel with quadruple spoke lacing. It is combined with the rim described, and together they form a unit that is simple, strong, enduring and efficient.

ENGINEERS' OR PETROL WAR?

One of England's most widely read automobile publications, the *Autocar*, takes exception to a statement made by a staff member of Field Marshal French's staff in which he characterized the European war as a "petrol war". This authority states: "Even now the motor transport is on its trial. It has stood the terrible strain of the historic retreat from Mons back almost to the confines of Paris; it has, also performed magnificently during the protracted trench warfare; and it only remains to be seen how it will stand the conditions of an advance. How greatly the future of war depends upon its performance under such conditions those who have read 'Eye Witnesses' (the staff officer mentioned above) account will fully realize, as they will grasp, if they have not previously grasped it, how much motor transport means to an army. Much as we are, naturally, predisposed in favor of calling the war a petrol war, we must say we think it is an incorrect generalization. What it really should be called is 'an engineers' war', as that terms covers, high explosives, howitzers, petrol vehicles and every form of modern science as applied to war."

MOTOR FUEL FROM MOLASSES.

A South African analytical chemist, Mr. Finnis-Wheldon, is said to have succeeded in distilling a motor fuel from molasses that is more efficient than petrol, and selling at less than eight cents a gallon still leaves the manufacturer a profit of 48 per cent. Intended as a substitute for petrol, the inventor has given his product the name of petrolex, and a company has been formed to exploit the process. The first distillery to be erected will have, it is stated, a capacity of about

a half a million gallons a year. Taken in connection with Dr. Rittman's recently announced discovery of a process to double the output of gasoline, the South African is a peculiar coincidence.

MASSACHUSETTS TRAFFIC CENSUS.

The Massachusetts highway commission is planning to take a census of the traffic over the roads of the state, as was done in 1909 and 1912. The expressed purpose is to provide information as to the character, amount, weight, distribution, etc., of the vehicles using the highways, which information is expected to be useful to the commission in determining where to locate roads and the best kind of a road for given localities. The census is likely to be taken for a week in August and one week in October, as was done in the former years.

BETHLEHEM SPARK PLUGS.

The Silvex Company, New York City, maker of the Bethlehem five-point spark plug for practically all makes of cars, as well as marine engines, has arranged to give the New York Sporting Goods Company, distributor of the Bethlehem motorcycle plug, its fullest co-operation by including its name and address upon the advertising cards displayed in the New York City subway. In addition thereto the distributor will receive representation on its Indian motorcycle and Smith motor wheel lines, of which the sporting goods company is the exclusive distributor throughout a large eastern territory.

AUTO CLUB CONVENTION.

The annual convention of the Pennsylvania Motor Federation will be held in Reading, Penn., April 17, and representatives from all parts of the state are expected to be present. At a recent meeting of the federation the following were chosen officers for the year: H. M. Minker, president; Leon E. Thomas, vice president; D. G. Ermentrout, secretary; J. V. R. Leinbach, treasurer.

The first union among jitney 'bus drivers is said to have been the organization of 22 drivers at Rock Island, Ill., and operating between Rock Island, Moline and Davenport.

SUGGESTIONS FOR THE NEW CAR OWNER.

The Unit Power Plant of the Ford Model T Chassis and the Elementary Principles of Gas Engine Construction That Are Applicable to It.

The 21st article dealing with the construction, operation, care and repair of the model T Ford automobile, deals with the elementary principles of gas engine construction as applied to the unit power plant, and points out essential facts that are necessary for every operator to know to successfully drive and maintain his machine.

SUCCESSFUL operation of any motor car depends upon the knowledge of the operator. A thorough understanding of principles of operation is essential to obtain even an average degree of satisfaction. The owner of a Ford car should realize that while general principles can be applied to practically all types of vehicles

est example of standardized manufacturing on a large scale the world has ever known and because of this standardization of production the machines are continued for long periods without change, aside from incidental body equipment that cannot be included in the mechanical design. For this reason the statements that shall be made with reference to the Ford cars will apply to the model T, and although there are other earlier types, these are seldom met with.

The model T Ford chassis is an exceedingly simplified design. As a matter of manufacturing

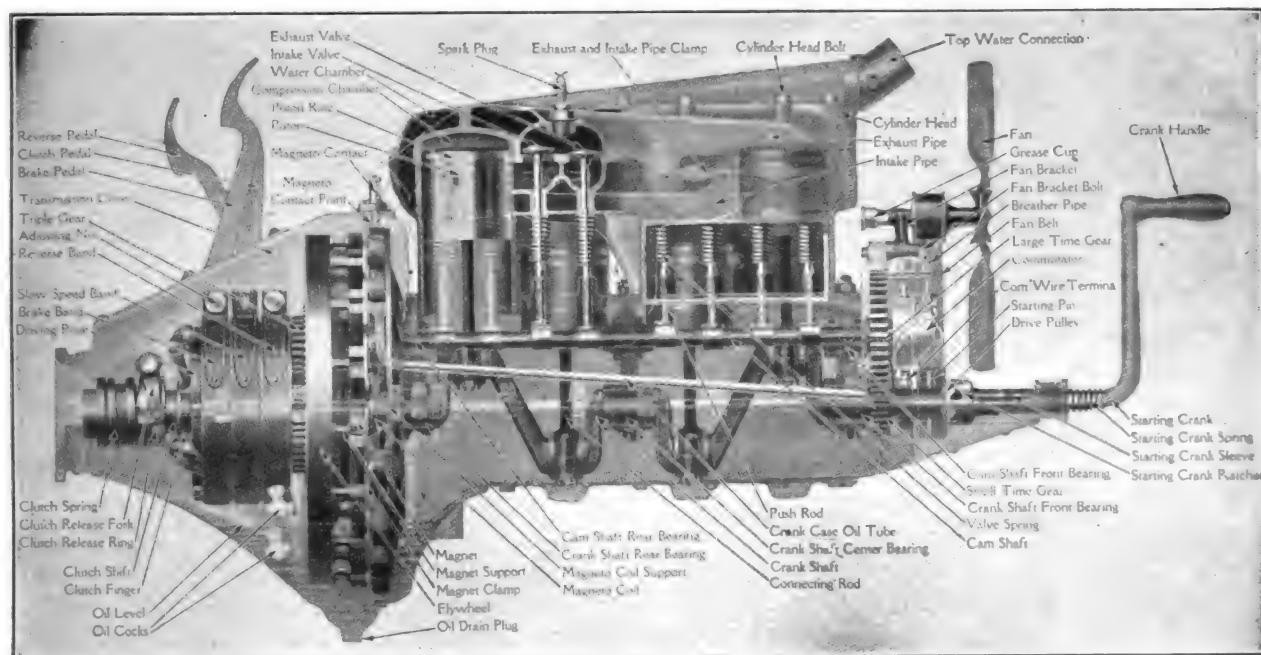


Fig. 44—Longitudinal Sectional View of the Unit Power Plant of the Model T Ford Chassis, Showing the Interior of the Crankcase and Sections of the Cylinders.

driven by gasoline motors, the designs differ from each other materially, and each machine has essential features of design that necessitate specific attention. The man who has experience with one vehicle will find that his knowledge is decidedly beneficial when he changes to another, but it will be necessary for him to vary or adapt many methods of operating, adjusting and even of care to obtain what may be regarded as equally good results.

The Ford model T car is probably the great-

est example of standardized manufacturing on a large scale the world has ever known and because of this standardization of production the machines are continued for long periods without change, aside from incidental body equipment that cannot be included in the mechanical design. For this reason the statements that shall be made with reference to the Ford cars will apply to the model T, and although there are other earlier types, these are seldom met with. The model T Ford chassis is an exceedingly simplified design. As a matter of manufacturing practically every part possible has been dispensed with. It has been perfected with the purpose of meeting every operating requirement, of being light in weight, having reasonable factors of safety, sufficient power to move it over all highways, and to be economical of fuel and lubrication. The chassis consists of what may be regarded as four sections or assemblies, these being the power plant, the power transmission system, the frame and the running gear and the steering gear and brakes.

The power plant consists of the motor and the planetary gearset, which is a unit, and this unit will, for the purpose of this consideration, be

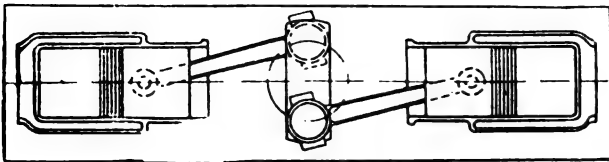


Fig. 45—A Two-Cylinder Opposed Motor, the Type Being Exceedingly Well Balanced.

first discussed. The second group or assembly include the driving shaft, the rear axle, the differential, driving shafts and rear wheels. The third group will include the chassis frame, springs, the radius rods, the front axle and steering connections, and the fourth group the steering column and connections and the brakes.

The description of the power plant and its auxiliaries, the lubrication, cooling and ignition systems, will necessarily include detail statement of principles of design and construction, much of which may be generally applied to motor vehicles, but the illustrations will be sketches that will define so far as is possible the Ford machine only.

The Ford motor is a four-cylinder, four-cycle, water cooled, L head vertical type. Each of these qualifying terms will be discussed in the order they are given.

Practicality of Four-Cylinder Motor.

The four-cylinder internal combustion engine is the type most generally in use, because it has been regarded by engineers as having all the qualities that make for practical utility. In this connection may be interpolated the statement that the ideal that all internal combustion or explosion motor engineers seek to attain is the control of the expansive force upon the piston of a cylinder so that it will as nearly as is possible approach the elasticity of the steam engine. To

better understand this one should know that a given volume of water will increase when vaporized according to the temperature, the steam becoming a gas that can be so compressed as to cause great pressure. The steam will maintain its expansive force so long as its temperature is not diminished. This steam is expansive in ratio to the pressure at which it is admitted to the cylinder of the engine, and the elasticity of the steam imparts a movement that is exactly reverse to that imparted to the piston of an explosive engine, which is what is known as a hammer blow.

Engine Is Single Acting.

The single-acting steam engine has a power impulse for practically the full length of the piston and this continues through nearly a half revolution of a crankshaft. The double-acting engine has a power stroke practically through the second half of the revolution, so that power may be almost continuously applied. The explosion engines generally used are single-acting, and nearly all automobile motors are of this type. At this point the matter of stroke becomes a material factor.

The flywheel or balance wheel of a steam engine serves two purposes. The first is to store the energy that the expansion has created and create power for a full revolution, or until the cycle can be repeated, and the second is that it affords a means from which the power may be taken by a bolt or other medium and usefully applied. When the piston is returned to the head or top of the cylinder the cycle is completed.

The Four-Stroke Cycle.

Thus the cycle of the steam engine is one movement in each direction the length of the cylinder, but the cycle of the explosion engine requires two full movements in either direction, or two complete revolutions of the crankshaft, and only one of these strokes is productive of power. In the steam engine the steam is injected into the

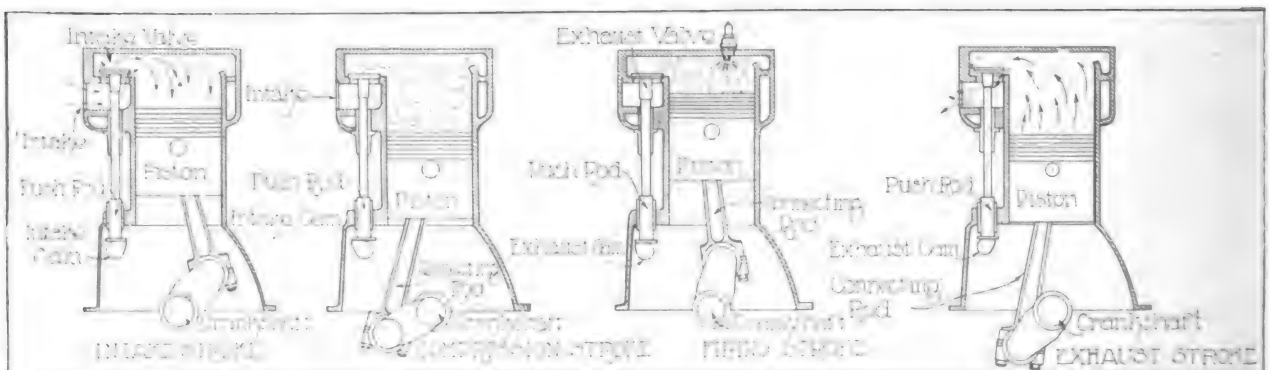


Fig. 46—The Functions of Each Cylinder of a Four-Cylinder, Four-Stroke Cycle Motor, to Cause One Power Impulse During Part of the Half Revolution of the Crankshaft.

cylinder under pressure, but in the four-stroke cycle explosion motor, the fuel is drawn into the cylinder without pressure, and this is done by

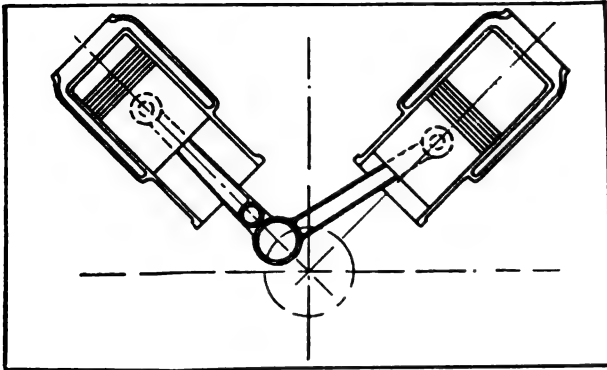


Fig. 47—A Two-Cylinder V Type Motor, a Design Used for Eight or More Cylinders.

the first movement of the engine piston, which aspirates the gas through a valve. When this stroke is complete the cylinder is filled with explosive gas, but the piston is at the bottom of the cylinder, and obviously no power can be created until the piston has returned to the top of the cylinder.

Not only this, the gas cannot create power until it has been burned and expanded, and to expand effectively it must be compressed. This compression is caused when the piston has reached the top of the cylinder. This completes one revolution. When the compression is greatest the gas is fired by an electric spark, and the expansion forces the piston to the bottom of the cylinder for the third stroke of the cycle, this imparting the power to the flywheel, and again the piston must be returned to the top of the piston to aspirate fresh gas, and this return movement

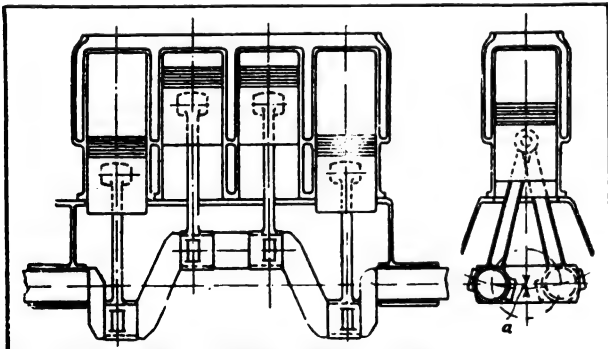


Fig. 48—A Four-Cylinder Engine, Showing the Longitudinal and Cross Sections and the Relations of the Pistons to Each Other.

forces the burned or burning gas from the cylinder through a valve. Thus four strokes of the piston complete the cycle, and in this cycle the piston has been given an impulse through a part

Mossberg Guaranteed SMALL CAR TOOLS

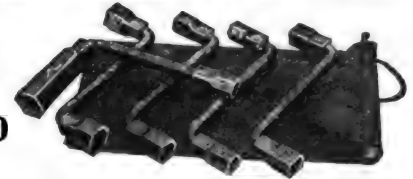
O
S
S
B
E
R
G
•
G
U
A
R
A
N
T
E
E
D
•
T
O
O
L
S



No. 30
Socket
Wrench
Set
\$4.00
Complete

An ideal
set for
light car
users

\$2.00



Small Car Socket Wrench Set No. 17
Ford Reverse and Brake
Pedal Wrenches

12c
Single End



S. E. Reverse Brake and Cylinder Head Wrench No. 640
Ratchet Reverse Wrench

50c

Best
Adapted

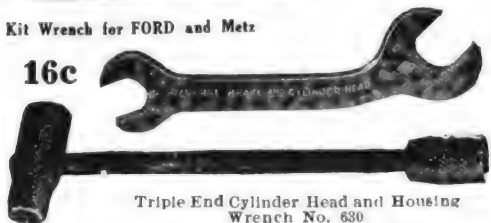
Ratchet Reverse Brake Pedal and Tension Spring
Wrench No. 645, No. 7454.



The "Old Necessary"
10c
Ford Hub Cap
Wrench No. 650

Kit Wrench for FORD and Metz

16c



Almost indispensable on cylinder head and Axle
Housing Nuts because the sockets are tapered **26c**



Valve Grinder
for Ford

The Logical Valve
Grinder

25c



FORD
Engineer's Set **\$1.00**

FRANK MOSSBERG CO.
ATTLEBORO, MASS.

If your dealer cannot supply you, we will ship prepaid on
receipt of price. Send for Catalogue No. 171 E.

of one stroke, while the energy of the explosion imparted to the flywheel must be sufficient to carry the load the remaining strokes of the cycle

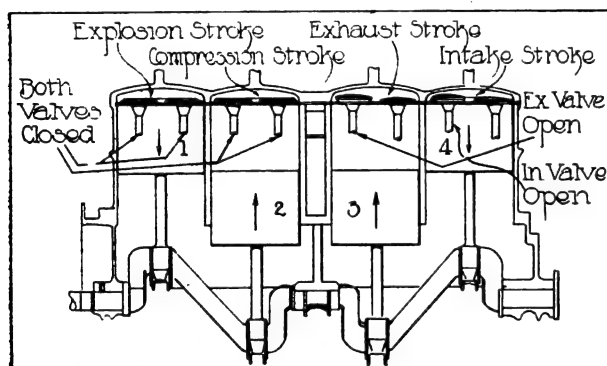


Fig. 49—The Relation of Each of the Four Cylinders of the Ford Motor at the Beginning of the Expansion Stroke in the First Cylinder.

until a fresh impulse can be given.

This principle applies to any number of cylinders, but it is evident that by having two cylinders diametrically opposed to each other with reference to the engine shaft that an impulse can be given every revolution. With four cylinders an impulse can be obtained every half revolution, with six an impulse every third of a revolution, with eight every quarter revolution, and so on. Engines have been built with as many as 22 cylinders, so that there were 11 impulses each revolution, but obviously with the multiplication of cylinders the number of parts correspondingly increased, and practically diminished.

The statement has been made that the four-cylinder motor has been generally adopted for automobiles because of it being practical. With the multiplicity of cylinders and the increased number of explosions during a revolution of the crankshaft there is a decrease in size of cylinder and the hammer blow of the explosion, and the movement of the crankshaft can be made much more even. That is, the power is more evenly applied. The explosive stresses upon the single-cylinder engine are marked at slow speeds, but as the number of revolutions are increased these stresses will be less pronounced until at very fast speeds the vibrations will be very much lessened, the increased velocity of the flywheel having a marked steadying influence. The single-cylinder engines of small bore and long stroke developed by a number of foreign manufacturers have been remarkably productive of power and are extremely devoid of vibration at high speeds.

Positions of Motor Cylinders.

One-cylinder motors may be either horizontal or vertical; two-cylinder motors may have the

cylinders horizontal, vertical or set at angles of 45 or 90 degrees; three-cylinder explosion motors are built, but these are the two-stroke cycle types; motors of four, six, eight, or any other multiple of two, cylinders may be built, and these may be horizontal, vertical or set at an angle. The vertical tandem arrangement of the cylinders has been favored to six cylinders because of accessibility and convenience, but motors with more than six cylinders have been usually with the cylinders in two banks set at an angle for a number of reasons. One of these is the extreme length of the tandem motor, and another is the difficulty of obtaining a sufficiently strong crankshaft without excessive weight, which also applies in a lesser degree to the camshaft.

The four-cylinder motor has been found to be extremely practical, and because of its simplicity has been adopted by the majority of the manufacturers. These engines can be designed to have abundant power to serve all ordinary requirements, the number of reciprocating or moving parts is minimized, and the work that can be expected of them has been proven in thousands of instances in racing and competition. Not only this, practically all the motors for trucks, which are designed for hard service, and are required to endure in all conditions of operation, are four-cylinder types. While it is true that it has not the uniformity of power impulses of engines with greater numbers of cylinders, it is thoroughly serviceable for whatever use may be made of it.

Practicality of Four Cylinders.

Generally speaking the four-cylinder, four-stroke cycle motor has the smallest number of cylinders that can be regarded as being practically efficient, and it has in effect one power impulse for each half revolution of the crankshaft.

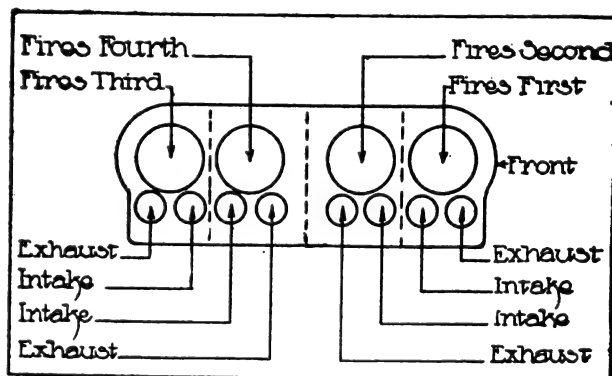


Fig. 50—The Positions of the Valves and Their Relations to Each Cylinder of the Ford Motor.

or what may be considered as power almost continuously applied. The average motor at high speeds will be steadier than at slow speeds, and

this effect becomes more pronounced when of the six and eight-cylinder types, this quality being as manifest when these are compared with the four-cylinder as when the four-cylinder is compared with the two and the single-cylinder engines. The greater uniformity of power of the six and eight-cylinder motors is, however, offset by the simplicity and greater accessibility of the four-cylinder, and this is a decidedly important factor when one realizes that a very large ratio of the efficiency of any engine is dependent upon the care and attention given it.

The Ford motor is assembled as a unit with the clutch and the transmission gearset, which are in some motor cars three separate assemblies, and these are all included in one housing or case specially designed to afford protection to the moving parts. The motor is, however, so far as its design and construction are concerned, no different in general principles than any other engine of similar type. There are numerous details that are individual with the Ford motor and power plant, which will be referred to as this consideration is continued.

The reader has been informed that the Ford motor is a four-stroke cycle type—that is, the piston makes four strokes the length of the expansion chamber to complete a cycle—and that each cycle requires two full revolutions of the crankshaft, and with the four-cylinder, four-stroke cycle engine there is a different stroke with reference to the cycle in each cylinder while the motor is in operation. These cycles are divided into four strokes by engineering nomenclature that are known as the suction, compression, expansion and exhaust strokes, and these will take place in each cylinder in that order. But because the cylinders cannot be fired consecutively—a condition that will be explained—there is what is known as a firing order for each motor.

With the Ford motor the firing order is, beginning at the front end of the engine, 1-2-4-3, and considering the cylinders consecutively from the front the relations of the strokes to each other are indicated by the following tabulation:

No. 1.	No. 2.	No. 3.	No. 4.
Expansion	Compression	Exhaust	Suction
Exhaust	Expansion	Suction	Compression
Suction	Exhaust	Compression	Expansion
Compression	Suction	Expansion	Exhaust

The accompanying drawings of four-cylinder motors will show that the crankshafts must have the crankpins, to which the piston or connecting rods are coupled, opposed to each other, and this being the case two of the pistons must be at the tops of the cylinders when the other two are at the lower ends of the stroke, and there must be

an interruption of one cylinder in the numerical order to have the four cylinders fired in turn. By noting the table one will see that the No. 1 piston is at the top of the piston cylinder, and No. 2 is at the bottom, and No. 3 piston is at the bottom of the cylinder and No. 4 at the top. With a half revolution No. 1 is at the bottom and No. 2 at the top, and No. 3 is at the top and No. 4 at the bottom. Because of this alternation, obviously when No. 1 was making the expansion stroke No. 2 was compressing the gas for the second expansion stroke, but No. 3, which was exhausting the cylinder, must draw in gas and compress it before it could be fired. No. 4, however, was drawing in gas and would be next in readiness to be fired.

(To Be Continued.)

MAXIM SILENCER FOR FORDS.

New Type of Muffler That Minimizes Back Pressure and Largely Economizes Fuel and Oil.

The Maxim Silencer Company, manufacturer of many kinds of silencers, are making a device for the muffling of the exhaust on Ford cars. The length of the silencer



The Maxim Silencer for Ford Cars.

is the same as the regular muffler and the diameter a trifle larger, it being $5\frac{1}{4}$ inches. When the exhaust gases enter the muffler they immediately expand into the expansion chamber in such a manner that they are given a cushion effect. When they reach this chamber they have a spiral motion, a characteristic of all Maxim silencers. The spirals are so arranged that the charge is evenly divided throughout the chamber, thus reducing the back pressure on the engine.

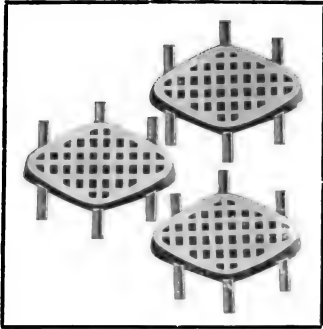
The company claims that much of the skipping at low throttle on Ford cars is caused by the excess of back pressure in the cylinders, which causes the fresh gas to become adulterated. By the installation of the Maxim muffler, the company claims the fresh gas will have greater inflammability, which will afford a greater power from a smaller charge of gas. The tail pipe is made a part of the silencer and it is so arranged that it clears the rear cross spring. The device is warranted not to burst from back fire explosions and is sold for \$6 complete with all attachments. The silencer may be procured from most of the best dealers in automobile supplies.

APCO RUBBER PEDAL PADS.

Equipment Specially Designed to Increase the Safety and the Comfort of the Operators of Ford Cars.

Of the many accessories that are supplied for Ford cars by the Auto Parts Company, Providence, R. I., one that will be of practical value to all drivers is the rubber pedal pads, which are adapted to be clamped to the foot pedals. As a Ford car is practically controlled by these foot pedals, it is essential that they be operated

with certainty. When the pedals are new they have knurled surfaces, but with use they rapidly wear smooth. If the soles of the shoes are slippery from mud, oil or water, the result can be plainly foreseen. The foot will slip from the pedal and if this should happen when control is urgent, as in congested traffic or on a hill, an accident might be caused. As a precaution and protection the pedal pads are necessary equipment for every car. They are made of pure soft rubber and are extremely durable. When the foot is placed on one of these pads it cannot slip, and soles of the shoes will not wear out as quickly as when placed on the metal pedals. The pads are fitted with six steel strips that are clamped around the pedal. The price is 50 cents a set. They are sold by dealers or direct by the company.



Apco Pedal Pads.

The pads are fitted with six steel strips that are clamped around the pedal. The price is 50 cents a set. They are sold by dealers or direct by the company.

MILLER RUBBER COMPANY.

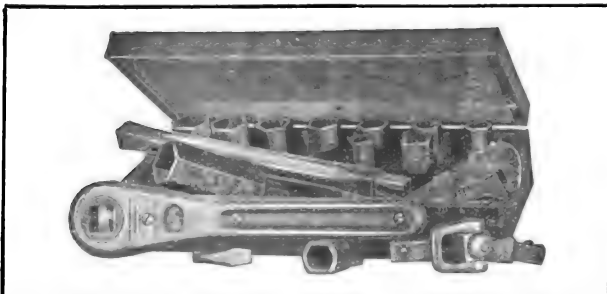
Manufacturer of Noted Tires Is Making Exclusive Agencies with Dealers in All Sections.

Following a nation-wide advertising and publicity campaign, the Miller Rubber Company, Akron, O., is making exclusive agencies in all parts of the country. The dealer in Miller tires, the company points out, does not divide his profits with others. He controls his own tire trade and meets with no competition from other Miller tire dealers. The latest addition to the Miller publicity medium is a new six-page folder. The company will supply these to dealers with their names imprinted on them. This folder makes answer to the skid question recently asked by the company in its national advertising campaign. This answer, the company states, should be sent to every car owner in each dealer's territory, and if any dealer has a list too large to fully supply the company will make a reasonable proposition of assistance. By addressing the company and mentioning the Automobile Journal, the inquirer will be sent complete details relative to the Miller campaign.

MOSSBERG SOCKET WRENCHES.

These Sets Are Made in Different Types and Sizes and Are Especially Saving of Time and Labor.

Every mechanic and owner knows the value of wrenches. They are invaluable when working upon the engine or body and to have the right kind of wrenches at hand is a great convenience. There are many nuts and bolts in a car that should be gone over and tightened at regular intervals. Many of these nuts and bolts are



Mossberg Socket Wrench Set No. 15.

in inaccessible places, and if the right kind of wrenches are not at hand they are frequently neglected or not well adjusted. Loose nuts and bolts create rattles which are

very annoying to the occupant and damaging to the car. The Frank Mossberg Company, Attleboro, Mass., is manufacturing socket wrench sets with which an operator can reach nuts and bolts wherever located, no matter how inaccessible to the hands.

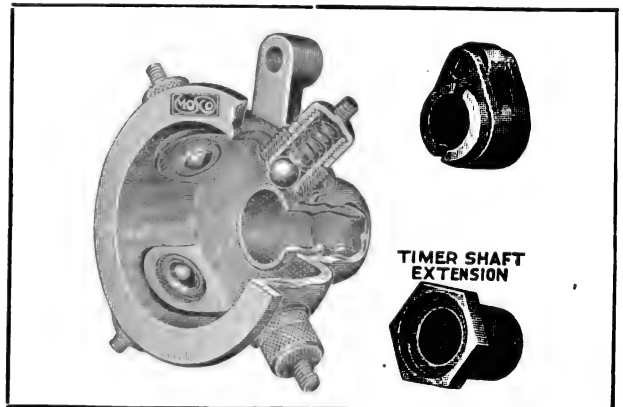
The company produces sets of different types and sizes for automobile work, these including sockets that are adopted for special purposes on different makes of cars. The larger sets are especially adapted for repair shop work where many tools are required. The socket wrenches are kept together in a box with their shank, etc. The dimension is plainly marked on each socket, so no time is lost looking for the right one. Various sets are made to fit Ford models, these ranging from a utility set for ordinary adjusting to one that is suited for overhauling the car. All the wrenches are thoroughly finished and hardened. The Frank Mossberg Company will supply complete details and prices of its products to any inquirer and will advise what will best serve any specific purpose.

The set illustrated on this page is known as No. 15, and sells for \$5.50. It contains a reversible ratchet handle, tubular extension bar, universal joint, screw driver bit, spark plug socket to fit Ford plugs, and 10 guaranteed hexagon, square and oval sockets. The hexagon sockets range in size from 17/32 to 31/32 of an inch; square socket sizes are 10/32 and 15/32 to fit 1915 main bearing bolts; oval socket fit previous to 1915 main bearing bolts.

BEMUS TIMERS FOR FORD CARS.

A Practical Equipment That Will Increase the Efficiency of the Ignition System and Will Long Endure.

The Motor Specialties Company, Waltham, Mass., distributor of accessories and equipment for automobiles,



Bemus Timer for Ford Cars.

is selling a timer for Ford cars which will, the company claims, minimize, if it does not eliminate, practically all ignition trouble, if installed. This is the Bemus timer, which is favorably known to motorists. The timer is simple in design, but rugged in construction. The inner wall of the timer is a fibre ring and the contacts, which are a ball type, are inset in the fibre ring. The balls are retained by contact plates, against which they are seated by helical springs. Each contact is always securely seated and the connection with the terminal is certain. One feature that should not be overlooked in this timer is that the parts are practically free from wear. On many distributors the contacts are set permanently in the ring of fibre, and as the cam or arm continually strikes them, the contacts and the ring will wear. In the Bemus timer the spherical surfaces of the balls resist wear and the springs will keep them in at exact height. To further insure long service, the distributing arm is fitted with a roll at the point where the contact is made. A good contact is assured at each revolution of the arm, by the meeting of the roll and the roller. When good contacts are made the motor will generally start easily. The price of the Bemus timer is \$2.25.



Twenty miles of Tarvia roads—

State Road, Kittery, Maine.
Constructed with "Tarvia X".

The motorist who rides out from Portsmouth, N. H., and crosses the State line at Kittery on the way to Kennebunk, Maine, will travel continuously over the new state road and for twenty miles will be always on a Tarvia roadway—firm, dustless, mudless—perfect in every way.

First comes a stretch of old macadam which has been treated with "Tarvia B" to prevent dust and preserve the surface. Then comes a stretch of tarviated macadam which has been built from the bottom up with "Tarvia X", the denser grade of Tarvia. Next is an area of gravel which has been treated with "Tarvia B" to preserve the surface, followed by two areas of "Tarvia X" construction. Further on in York and Wells are large areas of

concrete roadway which have been coated with "Tarvia A".

The road illustrates the versatility of Tarvia, and its applicability to varying conditions of traffic, varying character of foundation and varying character of road material.

There are many ways of using Tarvia effectively, and there are several grades of Tarvia to meet varying conditions.

Tarvia is, by nature, waterproof and adhesive. It contributes an element of plasticity to the roadway, obviating the tendency of ordinary macadam to crumble under modern automobile traffic.

The Tarvia treatment more than pays for itself by the decided saving in maintenance costs which it makes possible.

Special Service Department

This Company has a corps of trained engineers and chemists who have given years of study to modern road problems.

The advice of these men may be had for the asking by anyone interested

If you will write to the nearest office regarding road problems and conditions in your vicinity the matter will have prompt attention.

BARRETT MANUFACTURING COMPANY

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati
Pittsburgh Detroit Birmingham Kansas City Minneapolis Salt Lake City Seattle
THE PATTERSON MFG. CO., Limited: Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.



(When Writing to Advertisers, Please Mention The Automobile Journal.)

INDUSTRIAL HAPPENINGS AND COMMENT.

The Willys-Overland Company, Toledo, O., is stated to have sub-let to the Electric Auto-Lite Company the lease it held upon the old General Electric Company's plant in Champlain street, Toledo, for a period of three years, the rate being based upon a valuation of \$360,000. The Electric Auto-Lite Company is the consolidation of the original Auto-Lite company and the Saxon Manufacturing Company. Operations will be continued in the company's old plant, as well as in the new auxiliary, where electric starters, horns and other accessories will be manufactured. Most of the product will go to the Willys-Overland Company.

The H. H. Franklin Manufacturing Company, Syracuse, N. Y., established a new shipping record recently when a 22-car trainload of Franklin automobiles were dispatched from the factory for the Pacific Coast. The shipment was said to have a value of \$131,150, and it is claimed that it is the largest single shipment ever sent from the East to the West. The Franklin company is reported as working to full capacity.

The Lozier Motor Car Company, Detroit, Mich., has been reorganized and is again in operation at Detroit. The Plattsburg, N. Y., plant has been discontinued. Samuel Frank is the general manager of the reorganized company. While details are not yet available, it is stated that the company will produce soon a new light model. Orders on hand will keep the plant busy for the next few months.

The Baker Motor Vehicle Company, Cleveland, O., has reduced the price of its D. A. coupe from \$2800 to \$2475. This car is a four-passenger type, has a stated radius per charge of 50 to 85 miles, with a maximum speed of 23 miles an hour, and weighs less than 3000 pounds. Increased production is given as one reason for the reduction of the price.

L. B. Berger, specialty auto salesman, has been placed in charge of the sales of the Lozier Motor Company. Mr. Berger was formerly with the Willys-Overland Company in connection with the Willys-Knight car, which was manufactured in the Garford plant at Elyria, O., after which he joined the sales force at Toledo, which position he left to take up his present work.

The Studebaker Corporation has installed in its South Bend, Ind., plant a battery of cylinder lapping machines. The new machines complete the work of one entire cylinder block of six cylinders in one operation, a set of master pistons of exact size working rapidly in the cylinders while the block is clamped on the machine upside down.

The General Motors Truck Company's Detroit factory branch was stated as having been discontinued April 1. J. C. Ayers, manager of the branch, having been transferred as assistant sales manager at the Pontiac factory. The G. M. C. trucks will be sold by the Standard Auto Company, Detroit, Mich., which also is agent for Republic trucks.

The Grant Motor Company, Findlay, O., is now using the auxiliary plant it leased in South Findlay. The Grant chassis is being built at the North Findlay factory, the cars being completed at the auxiliary plant.

Blood Brothers Machine Company, Kalamazoo, Mich., builder of the Cornelian car, has orders sufficient to keep the plant busy for several months. It has laid a production schedule to build 25 Cornelian cars in April, increasing the product to 125 in May and 200 in June. The force of employees will be increased as the new machinery is installed.

The Regal Motor Car Company, Detroit, Mich., is stated to have placed its second contract for 1000 motors with the Port Huron Construction Company, Port Huron, Mich. The first order was for 1000 four-cylinder, light and small motors, the second being for an equal number of eight-cylinder power plants, both of which are the design of S. G. Jenks.

The Connecticut Telephone and Electric Company, Meriden, Conn., manufacturer of Connecticut automatic igniter systems, has been forced to make a third extension to its plant by increased volume of business. The new addition, consisting of four floors and basement, will be of brick mill construction, approximately 50 by 100 feet.

The Buick Motor Company, Flint, Mich., has informed

its dealers that the entire output for 1915, 42,000 cars, has been disposed of and that it is impossible to increase any original allotment. The company will announce its 1916 models in June, instead of August, as has been the custom heretofore, and is planning for a production of at least 60,000 cars, which is in advance of its 1915 schedule by nearly a third.

The Duplex Power Car Company, Charlotte, Mich., is stated to have received an order for 375 of its trucks from an exporting concern with offices in London, Paris, Petrograd, Buenos Aires, Johannesburg, and in other cities in China, Japan and Australia.

The Ware Motor Vehicle Company, St. Paul, Minn., is said to have received an order for 30 four-wheel driven Ware trucks for military service in Europe. It is stated that the price agreed upon is \$3500 for each truck.

The Bowling Green Motor Car Company, Bowling Green, O., is reported as being in receipt of orders for 1000 of its commercial cars. The order is said to have been placed by Wolseley Motors, Ltd., Birmingham, England.

The Sparks-Withington Company, Jackson, Mich., manufacturer of the electric Sparton horn and other products, has contracted for an extensive advertising campaign with the Taylor-Critchfield Company, Chicago, Ill.

The Swinehart Tire and Rubber Company, Akron, O., has begun the erection of a 100 by 120 foot, three-story addition factory building, which was made necessary by the increased demand for the company's tires. The present plant is working to full capacity, but its output was found inadequate to meet the demand. The company states that its non-skid pleasure electric vehicle tire is winning great favor among motorists, the volume of orders being greater than expectations. A new cord tire has been added to the Swinehart product, making the line more complete.

The J. I. Case Threshing Machine Company, Racine, Wis., is enlarging its business in the East, and has transferred J. R. Histed from the company's Kansas City, Mo., branch to the management of the New York City automobile branch at No. 1886 Broadway. Mr. Histed has had wide experience in the automobile industry.

The R. & L. Instrument Company, Beloit, Wis., has been organized with a capital of \$25,000 to manufacture a unique signalling device for automobiles. The device consists of illuminated discs attached to the front and rear of the car and containing two letters, R and L, meaning right and left. A push button on the steering wheel operates the signal light and the driver is thereby able to indicate to both vehicular and pedestrian traffic the direction in which he is about to turn. The patentees are the incorporators and are H. D. Ball, Leonard S. Carr, James Keeley and J. C. Floyd. A factory will be erected for the manufacture of the signal.

The Prentiss-Wabers Manufacturing Company, Grand Rapids, Wis., has leased for three years the former Wiperman table factory, and will start manufacture of gasoline and oil gauges, motorists' cooking and luncheon sets. The officers of the new corporation are: T. A. Taylor, president; D. B. Philleo, vice president; G. N. Prentiss, secretary and general manager; H. H. Wabers, general superintendent. Mr. Prentiss, formerly of Racine, Wis., is the designer and patentee of the articles to be manufactured.

The Ford Motor Company, Detroit, Mich., through the head of the sociological department, John R. Lee, states that the Ford plant is now employing 20,000 men of all nationalities. A year ago 55 per cent. of them had no knowledge of the English language. Today there are established classes where they are taught English. Mr. Lee also states that since the profit-sharing plan went into effect, accidents have decreased 54 per cent.

The Atwater Kent Manufacturing Works, Philadelphia, Penn., announces that the month of February was a banner month, the number of ignition systems shipped being more than 100 per cent. greater than the output of February, 1913. The present schedule for 1915 deliveries called for 60,000 systems, with the probability of a very heavy increase. An addition to the plant has just been completed to take care of the growing business.

PRACTICAL FACTS FOR OWNERS OF NEW CARS.

The Cole Eight-Cylinder Unit Power Plant—Suggestions and Advice for Operation and Maintenance—Useful Accessories and Equipment.

THE Cole eight-cylinder motor, that has attracted much attention since it was placed in the market in the chassis that has been a feature of the season's eight-cylinder types, is of particular interest to motorists. The engine, while in no sense novel, is noteworthy because of the extremely careful development of the design and the thought given to obtaining simplicity and accessibility, two especially desirable qualities in a motor of this type.

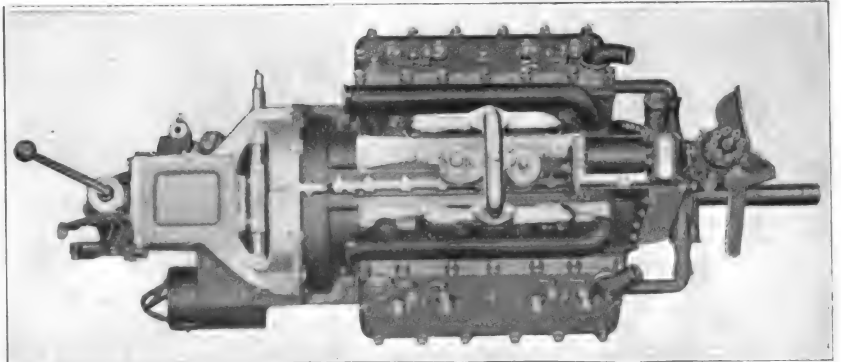
The engine is a four-cycle, water cooled, L head type, with the cylinders cast in blocks of four each, with the cylinders set at an angle of 90 degrees to each other, this following the conventional practise with eight-cylinder engines. The cylinder blocks are cast with the water jackets integral and with the generously water jacketed heads detachable, this making for accessibility to the water jackets and to the combustion chambers and valve pockets. The cylinder water jackets are large and are so designed that there is always free circulation of water around the exhaust valves, this insuring a cool and efficiently operating motor.

The cylinder bore is $3\frac{1}{2}$ inches and the stroke is $4\frac{1}{2}$ inches, and by the S. A. E. formula the horsepower rating is 39.22, but the claim of the manufacturer is that the motor will develop in excess of 70 horsepower. The cylinders are tested and finished with careful attention to the most advanced practise. Because of the necessity of obtaining even reciprocal motion, unusual care is taken to balance all moving parts. The cylinders and the pistons and piston rings are made of a high-grade of gray iron. The pistons are fitted with extreme care.

Crankcase Divided Vertically.

The crankcase differs from other designs in that it is constructed of two sections divided vertically, this having the flanges of the sections in the centre, which stiffens the crankcase and af-

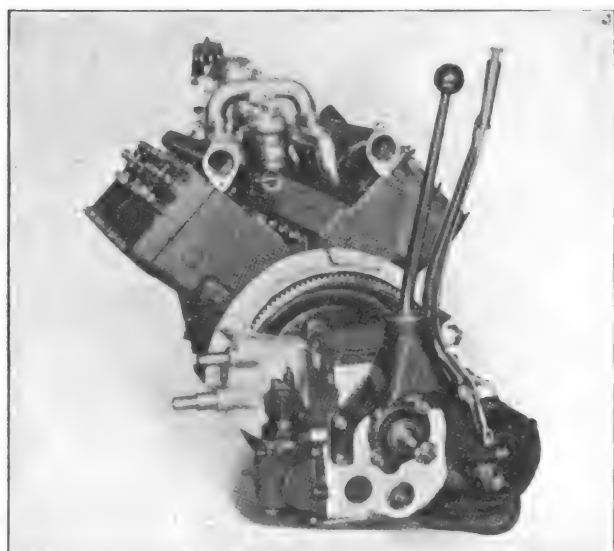
fords great strength directly under the crank and camshafts. The main bearings are carried in the right half of the crankcase, and when the case is disassembled the bearings are retained in the right section, so that they may be inspected or worked on even more conveniently than are those of the horizontally divided types. The crankshaft is a three-bearing type, and varies in diameter. The front bearing is three inches length, the centre bearing $2\frac{1}{16}$ inches diameter and three inches length, and the rear bearing $2\frac{1}{8}$ inches diameter and $3\frac{3}{4}$ inches length, this giving a total bearing length of $9\frac{7}{8}$ inches. The crankshaft is practically the same as that designed for the four-cylinder motor in that there are four crankpins, two connecting rods acting



Top View of the Cole Eight-Cylinder Unit Power Plant, Showing the Intake Manifold and the Exhaust Manifolds Between the Banks of Cylinders.

on each crankpin. The crankpin bearings are large and on each of these there is set the forked big ends of a series of connecting rods which revolve around the bearings in which the crankpins revolve, but the big ends of the other series of connecting rods clamp the bearings in exactly the same manner as the connecting rods of conventional construction. The bearing design is stated to be in every way satisfactory and enduring, and to afford extreme efficiency. The main and connecting rod big end bearings are of a very fine quality of babbitt with bronze shells. The claim is made by the manufacturer that the engine has the largest bearings of any eight-cylinder motor of the same bore and stroke.

The camshaft is a forging of special steel and the 16 cams that actuate the valves are forged integral with it. Extreme care is taken to form these cams and to finish them so that they will be accurate in their functions and endure in the work. The claim is made that with this type of camshaft the valve assembly of the Cole eight-cylinder motor requires about a fifth of the number of parts that would be necessary with a camshaft with eight cams. The camshaft is installed in the engine case directly above the crankshaft. The camshaft is driven from the crankshaft by helical gears that are noiseless in operation. The timing gears are enclosed in an extension of the crankcase and are fully protected and lubricated. The cover of the case is of pressed steel and is easily removable.



Rear View of the Cole Eight-Cylinder Motor, the Banks Being Comparatively Clear and Accessible.

The peculiarity of every eight-cylinder L head motor as compared with the four-cylinder types is that the valves are of necessity on the inside of the V or angle at which the cylinders are set. This is a necessity from design, for otherwise two camshafts would be necessary and the valves would not be as accessible, two cogent reasons why the valves should be so located, and because of this fact one can obtain a better realization of the timing and firing order by imagining two four-cylinder motors of L head type placed side by side with the valves inside. As a matter of fact this is what an eight-cylinder motor really is, although for the purposes of simplifying construction, but one crankcase is used.

The valve mechanism is conventional from every point of view. The camshaft is centrally

situated above the crankshaft and the valves are operated in either bank of cylinders, as in any other L head motor. The valve ports are $1\frac{1}{2}$ inches diameter and the valve heads and stems are tungsten steel, which will long endure excessive heat and will greatly resist wear. The valves are operated by silent pushrods that are raised and lowered by the cams of the camshaft. The valves can be easily reached by removing four bolts that retain the carburetor intake pipe, and access is obtained to the valves by removing cover plates on each cylinder block.

Lubricated by Pressure System.

The engine is lubricated by a force feed system, as splash distribution would not uniformly oil all parts of the engine, there being two banks of cylinders to lubricate, and for this reason the oil is drawn from a reservoir by a pump that is located under the timing gear cover at the front end of the engine case. The pump is positive in its action and forces the oil through tubing at a pressure of 30 pounds to the main bearings. In the bearings are holes that register with holes in the crankshaft, so that at each revolution a predetermined quantity of oil is forced into the bearings. Holes in the crankshaft lead to the connecting rod bearings, and from these bearings the excess of oil is distributed by centrifugal force in the form of spray to the camshaft, camshaft bearings, valve mechanism and the timing gear. The oil circulates through a sight feed gauge on the dash so that there is always indication to the driver of the condition of the lubricating system.

Cooling and Other Auxiliaries.

The motor is cooled by a circulation of water through the large water jackets and the radiator, this being forced by a centrifugal pump of sufficient capacity of a floating type, this term defining it from the fact that it is not rigidly connected to the engine case. This pump can be readily repacked whenever this is necessary. The statement is made by the manufacturer that the motor can be cooled more efficiently than the majority of other engines. Radiation is also afforded by a large fan that is driven by a silent chain from a sprocket on the crankshaft. This fan is not fixed on the shaft, but is operated by a friction clutch so that it can be turned independently of the shaft. The purpose of this construction is to prevent damage to the fan blades when the motor is being driven at fast speed, and there is need to stop it quickly. The fuel is supplied by a Stromberg carburetor by a vacuum system. The Delco system of ignition, lighting and starting is used, there being three separate units. The

weight of the installation is said to be no more than when the system consists of one or two units.

The clutch is a leather-faced cone that is adjustable, and the transmission gearset is a selective sliding gear type that affords three forward speed ratios and reverse. The motor is suspended in the frame at three points that insures it against the strains of chassis distortion.

Firing Order of the Motor.

The firing order of the motor, which has previously been referred to, and which will interest every owner, has been illustrated by diagram that will be understood. The reader has been asked to imagine two four-cylinder motors set side by side with the valves inside. The cylinders on the one side will be reversed with reference to the cylinders of the other side. Now if

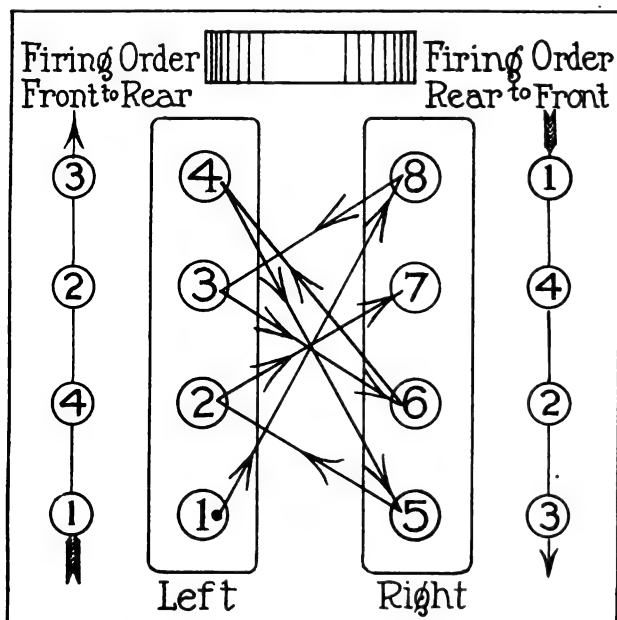


Diagram Showing the Firing Order of the Cole Eight-Cylinder Motor, Representing the Cylinders as Seen from in Front of the Radiator.

one stands at either end the firing order of one bank of cylinders will be 1-3-4-2, and if one should then go to the other ends of the motors the opposite bank would fire in the same order—1-3-4-2. This is the same with the Cole eight-cylinder motor, but for the convenience of the operator the cylinders of the bank at the left of one standing in front of the radiator or motor are numbered 1-2-3-4, and the cylinders of the bank at the right are numbered 5-6-7-8, counting from the front. Any eight-cylinder motor must fire alternately on the banks, and beginning with the first cylinder of the left bank, and the last cylin-

Write today for
our Territorial Agree-
ment on the New
\$1,000
Inter-State
"FOUR"
The ONE popular priced car with
the greatest selling arguments
in the country
INTER-STATE MOTOR CO.
804 W. Willard St.,
MUNCIE, IND.

HAVOLINE OIL
"It Makes a Difference."

Motorist:—"I want you always to use
HAVOLINE OIL in my car. It
makes a difference."

Garageman:—"Yes sir! and it is easy
to sell. It is the best advertised oil
on the market. You can't imagine
the new business we have gotten
here through the sales helps fur-
nished by the Indian Refining Company. A
very large percentage of our tourists' trade
call for HAVOLINE OIL."

INDIAN REFINING COMPANY
17 Battery Pl. Dept. L New York

Be sure you sell the oil in the
Blue and White Can with
the inner seal. We offer the
garagemen the best packaged
goods proposition on the
market. Write for our Rep-
resentative or for full infor-
mation. Be sure and write
for the "Sales Order."

PAIGE "36"—\$1195
"25"—\$ 925

Leaders of popular-priced cars—thoroughly built, completely
equipped, backed by a strong organization. Specifications and cat-
alog on request.

PAIGE-DETROIT MOTOR CAR CO.
Detroit, Michigan

Thermoid
HYDRAULIC COMPRESSED
Brake Lining-100%
THERMOID RUBBER CO., TRENTON, N. J.

THE MOTOR TRUCK
A Recognized Authority in the
Commercial Vehicle Field
12 ISSUES \$2.00 THE YEAR

When Writing to Advertisers, Please Mention The Automobile Journal.

DIXIE ^{20TH} CENTURY MAGNETO

A full spark at lowest possible engine speed, increasing in intensity to top engine speed with none of the lag at higher speeds associated with timer distributors—

this is the
20th Century DIXIE



SPLITDORF
Electrical Co.
NEWARK, N. J.

(All SPLITDORF features are fully covered by patent or patents pending)

Perfect Ignition Guaranteed by Using

REFLEX

SPARK PLUGS

EVERY Reflex plug is sold under a guarantee of perfect satisfaction after 30 days' trial—or return it and get your money right back, without argument, explanation or delay.

EVERY Reflex plug has our patent Baffle that reflects the soot and dirt away from the interior and out through the spark gap at every explosion. In connection with the enclosed end this makes Reflex plugs practically self cleaning and long-lived.

Used by leading automobile and motorcycle manufacturers. We sell direct where we have no dealer. Write for Catalog and prices.

C. M. FOSTER, Sales Agent
51 Bowker St. Boston, Mass.

THE REFLEX IGNITION CO., Cleveland, O.

Enclosed end, Baffle.



McQUAY-NORRIS MFG. CO.,

Dep't D, ST. LOUIS, MO.

In Use on Over
300,000
Automobiles
"ASK THE USER"

(When Writing to Advertisers, Please Mention The Automobile Journal.)

der of the right bank, the firing order is, in the order of cylinders, as the reader has been asked to imagine. But as the cylinders have been numbered consecutively for the convenience of the operator, when the firing is referred to by the manufacturer, as will be noted from the accompanying sketch, the firing is 1-8, 3-6, 4-5 and 3-7. Or, to put it another way, no matter at which end of the motor the operator may be the first cylinder to fire is the first of the left bank, and the second is the last of the right bank. The order from these two cylinders is thereafter 3-4-2 alternately on the banks.

READERS' QUERIES.

Suggestions to Owners on Motor Misfiring, Removing Grease, Loss of Power, Motor Overheating, Dry Cell Peculiarity and Radiator Boiling.

Motor Misfiring—C. E. McN., St. Petersburg, Fla.

I have a four-cylinder motor equipped with a Bosch magneto and Rajah spark plugs. I have had quite a little trouble with the motor missing, both at high and low speeds. In going over the ignition system carefully I found that the magneto breaker box platinum points break about 15-1000 of an inch on one side of the breaker box and about 18-1000 of an inch on the opposite side. I also found that by adjusting the points of my spark plugs in numbers one and four cylinders to about 20-1000 of an inch apart and adjusting those in numbers two and three cylinders to 30-1000 of an inch, that the motor would run perfectly, both at high and low speed. But I was surprised to find that by exchanging the plugs from numbers one and four to numbers two and three cylinders that the motor would not run at any speed without missing. I have tried different adjustments of the magneto points, but always find that better results can be obtained by adjusting the spark plug points as stated. I am an automobile mechanic with 14 years' experience, but this is something new to me. I would like to be informed if there is a relationship existing between the adjustment of the magneto points and the adjustment of the spark plug points. In other words, if the magneto has a slightly different break on cylinders one and four than the break on two and three, can the trouble be overcome by adjusting the spark plug points to suit?

From way your letter reads I would say that the magneto would warrant close inspection. I do not know of any relationship existing between the adjustment of the magneto points and those of the spark plug, but both must be set correctly. Were your letter more definite as to the firing order this might lead to a closer analysis. The rollers of the breaker box are not of a size, which accounts for the difference in the contacts, but this is no doubt obvious to you and is considered in your letter. There is a possibility of a leaky circuit.

Cleaning Greasy Chassis—F. M. S., Toledo, O.

What method or means can be used for cleaning chassis and motors when greasy? There appears to be nothing in the market for the purpose. We have tried

steam from a heating boiler, but can use this in winter only. We have also tried various types of air-pressure gasoline systems, but the fumes caused by the spray is dangerous. If there are any substitutes for gasoline outside of hot soda water, kindly advise?

So far as the writer knows, the only practical solvents that are utilized to remove grease from machinery and chassis are gasoline, kerosene, soap and potash mixtures. Factories and shops employ many means for removing oil and grease. A large paint shop keeps a tank of water heated and forces it through a rubber hose to the work by steam pressure. This firm finds this method practical for cleaning chassis the year round. Another concern has large vats filled with potash mixtures in which the parts are boiled. When varnish and paint are to be preserved this method is not advisable because of the paint destroying qualities of potash. Kerosene oil is sometimes used, this being driven through a hose by air pressure and applied as a spray. It creates little if any gas and is not dangerous or destructive. The disadvantage of this method is that the oil does not vaporize readily, but it solves the grease and the parts can be wiped or allowed to dry.

Query—The editor would like to hear from any reader who knows of any other means that are practical for removing grease from machinery and chassis.

Loss of Power—E. N. H., Meriden, Conn.

Lately I have been troubled with a loss of power in my motor. The loss is very noticeable when climbing hills or when using the first and second speeds to any extent. I have ground the valves and cleaned and adjusted the carburetor according to instructions. I have tried all the remedies, such as tightening connections, etc., but fail to find the trouble. Can you suggest anything that may help me?

It is probable that the carburetor is not getting its full supply of gasoline. Be sure that it is fully turned on at the tank. Many times particles of dirt will collect in the tank or pipe, thereby impeding the flow of gas to the carburetor. As the high speed does not require the amount of gas that the other speeds do, the motor may not be affected at this speed, but when the first or second speeds are used they require a larger amount of gas, therefore the result is that the fuel draught upon the carburetor is for more than it can supply. The same result is true when climbing a hill. The gas is consumed quicker than it can be supplied. Remove the main gasoline pipe and clean it thoroughly. Open the check valve at the tank and see if the gas flows evenly.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Bosch

BOSCH

Magnetos

the dependable ignition system for all cars, was used by every car to finish in the

Vanderbilt Cup Race
Grand Prize Race
Venice Road Race

Is your ignition system as dependable or as popular?
Bosch will make it so

Be Satisfied **Specify Bosch**

Correspondence Invited

BOSCH MAGNETO CO.
204 W. 48th St., New York
250 Service Stations

Write for full particulars



Why Freeze Yourself?
Ruin Your Auto?

The Superior Safe Garage Heater

SAFE. NO FUMES.
NO GASES

Equipped with pilot light. No matches, no danger, no discomfort. An ideal positive heater.

SUPERIOR MANUFACTURING CO. N. S. Pittsburgh, Pa.

The Easiest Riding Car in the World

MARMON

F. E. WING
562 Commonwealth Ave.
BOSTON, MASS.
New England Dealer for

MARMON "41"
\$3250
132" Wheelbase

MARMON "48"
\$5000
145" Wheelbase

NORDYKE & MARMON CO., Indianapolis, Ind.


"Don't Gamble With Safety"
Demand the Improved, Guaranteed

S-M-C Asbestos Brake Lining

Sold by all dealers or direct by manufacturer
STAYBESTOS MFG. CO. Germantown, Philadelphia, Pa.

Meet me at the
Tuller

For Value,
Service, Home
Comforts




New HOTEL TULLER
Detroit, Michigan

Center of business on Grand Circus Park. Take Woodward car
get off at Adams Avenue.

ABSOLUTELY FIREPROOF

200 Rooms, Private Bath,	\$1.50	Single,	\$2.50	Up, Double
200 " " " "	2.00	"	3.00	" "
100 " " " "	2.50	"	4.00	" "
100 " " " "	3.00 to 5.00	"	4.50	" "

Total 600 Outside Rooms. All Absolutely Quiet.
Two Floors—Agents' New Unique Cafes and
Sample Rooms Cabaret Excellence



SPEDOLINE solves the problem of automobile
and motor truck gear lubrication. One trial
is all we ask. "A fair field and no favor"
will demonstrate to your satisfaction that
SPEDOLINE is the King of all lubricants for
gears.

Henry H. Kroh, Boston Distributor.
MANUFACTURED BY
Continental Asbestos Corporation, Worcester, Mass.

MOTOR PARTS COMPANY
OFFICIAL
BOSCH DISTRIBUTOR

Zenith Carburetor Mohawk Tires Leak-Proof Rings

185-187 Columbus Avenue, BOSTON
818 No. Broad St., PHILADELPHIA SPRINGFIELD, MASS.

Peerless Quality in Smaller Size

"ALL PURPOSE" FOUR AND SIX
FOUR AT \$2,000 (Sixes \$250 Extra)

THE PEERLESS MOTOR CAR CO., CLEVELAND, OHIO

Makers also of the "48-Six" and Peerless Trucks.
Licensed under The Kardo Patents.

TEXACO
MOTOR OIL

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Motor Overheating—F. H., Woonsocket, R. I.

Of late I have been troubled with overheating. The water circulation seems to be normal and the oil flows in the usual manner. What else could be the cause of it?

Overheating of the motor is not necessarily confined to the oiling and cooling systems. These have regular functions and under normal conditions they will meet all requirements, but they cannot counteract other influences that may result from wear or from lack of adjustment.

Leaky piston rings often are the cause of heating. Piston rings may become leaky in many ways, some of the causes being as follows: Breaking, the rings turning so that the slots come in line, carbon deposit under the rings, loss of elasticity, etc. Any of these conditions will allow the hot gases to pass to the crankcase, the result being an excess of heat which cannot be radiated. Defective valves is another cause for heating. A valve stem may become so warped that it will stick in the guide; if carbon is deposited between the valve head and seat, so that the valve cannot seat, defective valves will allow the gases to escape or cause them to burn without explosive force. As much or more heating is caused from an excess of fuel as from all other causes combined. Too much gas and not enough air forms a mixture to be taken into the cylinder so rich that it will not burn as quickly as intended. A leaky float in the carburetor allows the gasoline level to rise above normal and the result is a rich, slow burning mixture.

When a float is leaky it should immediately be repaired. If it is of cork it should be dried and treated with a coat of shellac, which will cause it to resist absorption of gasoline. If it is a metal type, it should be removed and soldered. When soldering, make sure that all gas is driven from the float. This can be done by heating. Do not use too much solder, as care must be used not to overbalance it. The reason that rich mixture causes heating is that its combustion is slow and greater heat is generated, which is more than the radiating system is designed to dissipate. Late firing in the cylinders will also result in overheating. If the valves, etc., are correctly timed and the motor is firing late, the distributor plate of the magneto should be set so that it will meet the distributor arm earlier.

Dry Cell Peculiarity—J. B. S., Indianapolis, Ind.

Will you inform me why a dry cell will throw off a thick molasses-like fluid? I am using Columbia Igniters No. 6 in an electric lantern and in experimenting with it for perfecting purposes I use new cells, turn them on and leave them burn until exhausted. In one case they were subjected to a perfect ground, but when I insulated them from it they did the same thing.

Dry cells are generally a zinc cup or case,

lined with heavy absorbent paper (sometimes specified as pulp) which is saturated with a sal ammoniac solution or a solution of sal ammoniac and chloride of zinc. In the centre is the stick of carbon, which is the positive electrode, with the base insulated from the zinc case by a small blox of paper or pulp. The space between the lining of the case and the carbon stick is filled with a depolarizing compound, which is usually dioxide of manganese and carbon dust, the latter to increase the conductivity of the dioxide of manganese. The more the depolarizer is compacted, the less the internal resistance of the cell.

The depolarization of dry cell is slow. The dioxide of manganese will slowly absorb or assimilate the hydrogen liberated by the action of the sal ammoniac on the zinc case, for the gas will be attracted toward the carbon stick. But because of the limited capacity of absorption of the dioxide of manganese the hydrogen will reach the carbon and cause polarization and loss of capacity for the time being. If allowed to rest, depolarization will take place and the cell is said to have recuperated.

The cell is sealed to prevent evaporation of the dampening solution by a compound that is made fluid by heating. Were the absorbent paper dry the cell would be inactive. Dry cells are designed for intermittent, and not continuous use, because of the quick polarization. A short circuit will undoubtedly heat the zinc case of a dry cell sufficiently to melt the sealing compound in contact with it, and continuous use, unless the load is very small, will have the same effect, at least until polarization resulted. Excessive heating will result from a short circuit with any form of cell, or from overloading. The effect will be more or less destructive. If you require dry cells in your experimental work, use lamps of smaller capacity and improve the qualities of the reflectors, that is, if continuous lighting is essential.

Motor Trouble—A. P. Glen Falls, N. Y.

Recently I had my car overhauled by a local repair man and since then I have been troubled with skipping, which is very noticeable when the car is throttled down to 15 miles and under. The carburetor is evidently all right, as I had it examined by an expert. Would appreciate it if you could suggest anything that may be of benefit to me.

There are many things that will cause the motor to miss, but taking it for granted that all connections are tight and that the wiring is correct, this trouble may be the result of weak magnets on the magneto. If the magneto has been taken apart, the magnets may not have been re-

When Writing to Advertisers, Please Mention The Automobile Journal.

FOR WINTER LUBRICATION

Polarine

the standard oil for all motors.

Feeds freely down to zero.

STANDARD OIL CO., OF NEW YORK

Principal Stations

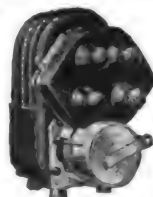
New York
Buffalo



Albany
Boston



Model
BX-4



HEINZE



HEINZE MAGNETOS are superior both mechanically and electrically. Equip with HEINZE and your Ignition requirements will be satisfied.

HEINZE ELECTRIC COMPANY

Factories—Lowell, Mass. Sales Offices—Detroit, Mich.
Branch Offices—New York, Detroit, Chicago, Minneapolis.
New England Agent—Arthur Patch Homer, Boston, Mass.

AUTOMOBILE ELECTRIC LIGHTING SPECIALTIES

For the Automobile Owner and Manufacturer
who wants SERVICE for his money

ELECTRIC LIGHTING SPECIALTIES Made to Order

CULVER-STEARNS MFG. CO.

Worcester, Mass.

Detroit, Mich.

Raybestos

REG. U.S. PAT. OFF.

"THE ORIGINAL AND BEST ASBESTOS BRAKE LINING"

THE ROYAL EQUIPMENT CO., BRIDGEPORT, CONN.

New Dover Galvanized Garage FUNNEL



The first practical large
size (3gals.) Garage Fun-
nel at a popular price.

Send for 1914 Catalogue

DOVER STAMPING & MFG. CO.
(3) CAMBRIDGE, MASS.

**DIXON'S
GRAPHITE
HEAT-RESISTING
GREASE NO. 676**

There's a new booklet des-
criptive of this and other
members of the Dixon
Graphite Automobile Lu-
bricant family. It's num-
ber is 210-G. Write for it.



Made in Jersey City, N. J., by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827

F. SHIRLEY BOYD

175 Massachusetts Ave., Boston, Mass.

R. I. V. Ball Bearings.

Baldwin Chains and Sprockets.

J. H. Sager Line.

Mea
MAGNETOS



**S. R. O.
BALL BEARINGS**



Sole Importers

MARBURG BROS., 1790 Broadway, NEW YORK



BALL BEARINGS REGROUND

at one-fifth the cost of new, also New
Single Row Annular, Thrust, New
Departure Double Row and Radax
Bearings.

AHLBERG BEARING CO.

Boston Chicago Detroit
New York Los Angeles Cleveland

VALVOLINE OIL CO.

Heavy, Medium and Light

Automobile Oils

27 STATE STREET BOSTON, MASS

(When Writing to Advertisers, Please Mention The Automobile Journal.)

placed properly. Magneto magnets have a south and north pole. On close inspection, a letter will be found at the end of the magnet denoting the pole. If the magnets are placed contrary to letter and are allowed to run in this condition, they will soon demagnetize the entire set.

If the magnets have not been recharged within a reasonable length of time, they may have become weak. Weak magnets always cause missing at low speeds. The ordinary sized magnet should be able to lift and hold a 15 pound weight when it is efficient. If the skipping appears at regular intervals the trouble may be found in the spark plugs. Many times oil will permeate the mica of the plug and cause a ground. At high speeds the skip may not be noticeable because of the highly heated spark being able to resist the oil, but when the motor is run at low throttle the spark is not so hot and easily grounds to the oil.

A plug with a small crack in the porcelain will miss firing as soon as it becomes heated because the electrical current will follow the crack and short circuit, it being the easiest way out. Examine the spark plugs, removing the cores to see that they are not oil saturated or cracked. This may be the cause of your trouble.

Motor Overheating—I. D. H., Chicago, Ill.

What is the cause of over-heating the motor, or the radiator boiling? Is it the fault of the radiator, or is it the fault of carelessness in operating the motor, by giving an uneven mixture of too much spark and too little gas, or giving too much gas and very little spark, or giving sufficient gas and spark, or in general, racing the motor, or leaving the car running stationary?

There are many causes for engine heating. Usually the cooling system of a motor will be sufficient for normal operation. The highest efficiency of water as a medium for engine cooling is slightly less than the boiling temperature, not less than 200 degrees, and if the water can be circulated rapidly at this point it will serve every purpose well. If, however, there should be insufficient circulation—that is, the movement of the water through the radiator should be slower than the rate that will keep the temperature below the vaporization point, obviously the remedies may be greater pump capacity, increased size of connections between the water jackets and the radiator, or greater radiator area, provided that the high engine speed is necessary. This statement is made with the assumption that the other operating conditions are normal. Many cooling systems that are ordinarily adequate for the motor may, when the machine is driven hard, as at fast vehicle speed for a considerable period, or when

climbing a long ascent, or driving in sand, cause the cooling water to boil.

Assuming that the system has been efficient, and water in it has been caused to boil. There are a number of reasons that might apply. The key securing the pump impeller to the pump shaft may have sheared and the impeller is loose, preventing the normal movement of the water through the intake to the water jacket the impeller may be so worn that it will not afford the designed impulse to the water; the hose connections may be so constructed from the action of the heated water as to retard the designed flowage; the radiator may contain an accumulation of sediment that will considerably reduce its effective radiating area; a water passage in the engine jacket may be constricted from rust; a slipping fan belt may reduce the draft of air through the radiator; some of the air passages in the radiator may be sufficiently obstructed as to much lessen its normal radiation; there may be an air lock in the circulating system. These conditions can be determined by examination of the fan belt, of the pump, of the hose connections, of the water jackets; the radiator can generally be cleaned by flushing, but the other causes will require more or less mechanical work.

An unusual but not improbable cause of overheating is the obstruction of the water passages of the engine jackets by pieces of the core that were not removed from the casting.

A very frequent cause is a well retarded spark that will not afford complete combustion, but more frequently excessive heating will result from a late spark and an advanced throttle. When an engine is running idle a late spark will quickly cause it to heat, while often when running idle there is not sufficient circulation of air if the machine is standing. Poor lubrication is another cause that is not always realized, for this will add the heat of friction to the cylinders, which will not be radiated as is the heat from combustion.

Normally an engine should be driven with the spark as far advanced as is possible and with the least gas that will afford the desired power, the variations of speed being obtained by moving the throttle instead of the ignition control lever. This position of the spark will minimize the possibility of excessive fuel consumption and the probability of heating, provided that the cooling system is functioning normally.

A TIRE CHAIN HINT.

In the spring of the year, when the frost is coming out of the ground, one is liable to en-

(When Writing to Advertisers, Please Mention The Automobile Journal.)



This is the open season for long distance touring—touring to the California Expositions.

Tours of this character—running day in and day out, over mountains and through desert sand which makes motors subject to overheating—this sort of touring calls for the best in motor lubricants.

The motorists who make the transcontinental trip on HARRIS OILS are the ones who will not be held back by lubrication trouble for HARRIS OILS are pure oils. They preserve and prevent wear of moving parts. These lubricants will not "gum up" or "break down"—they are satisfaction producers.

"A Little Goes A Long Way And Every Drop Counts"

A. W. HARRIS OIL CO.

326 S. Water St. Providence, R. I.
Branch: 143 No. Wabash Ave., Chicago, Ill.

ALDING PORCELAIN PLUGS



Regular
75c Value

50c
EACH

Write for a gallon of the famous
"ALDING" Oil, in "DUCK" Can, 75c Delivered
ALSTEN & GOULDING COMPANY
25 Foster Street, Worcester, Mass.

For Perfect Control and Safe, Comfortable Driving use

Weed Anti-Skid Chains

At all Reputable Dealers

WEED CHAIN TIRE GRIP COMPANY, BRIDGEPORT, CONN.

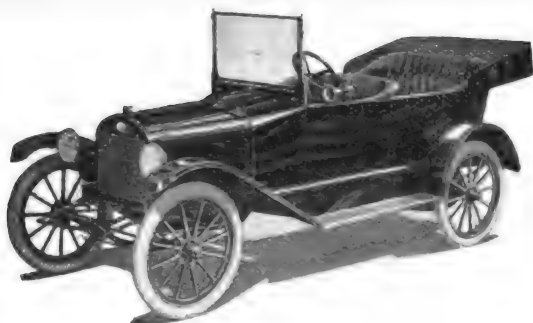
BRAENDER TIRES & TUBES



Are of the highest quality and the cheapest on mileage. They are built to last. Send for price list and particulars.

BRAENDER RUBBER & TIRE CO.

Main Offices and Factory, RUFHERFORD, N. J.



METZ "25"

The Quality Car

\$600 Equipped Complete, Including Gray & Davis Electric Starter and Electric Lights

It is evident to a great many dealers that the public is looking for **quality and completeness of equipment** in a low-priced car. The new METZ Touring Model embodies all the leading features of other high-grade cars, and is listed at an exceedingly attractive price.

Our Roadster Model, the METZ "22," with new fore-door body, sells for \$495 fully equipped.

METZ Cars will enable you to supply the popular demand in your territory.

Write us if interested, and ask for new illustrated catalog "Q."

METZ COMPANY, WALTHAM, MASS.

EISEMANN

The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.

The Eisemann Magneto Company

Sales and General Offices,
32-33d St., Brooklyn, N. Y.

New York, N. Y. Indianapolis, Ind. Detroit, Mich.
123 W. 52nd St. 415 N. Capitol Av. 802 Wd'v'd Av.



REXO II \$3⁸⁵

The GARFORD MANUFACTURING COMPANY, 2506 Olive St., ELVIRA, O.

Successors to THE DEAN ELECTRIC COMPANY.

THE MOTOR TRUCK

A Recognized Authority in the Commercial Vehicle Field

12 ISSUES

\$2.00 THE YEAR

(When Writing to Advertisers, Please Mention The Automobile Journal.)

counter mudholes, especially in the country. Even with the usual tire chains the rear wheels may sink deep in a soft surface and the car cannot be moved, although the wheels will spin. In such an emergency the following suggestion may be found useful. If the wheels sink and continue to spin, stop the car and remove the chains. Wrap the chains around the tires so that there are two turns between two spokes and tie the ends firmly. This will fix each chain in one place around the diameter of each tire. Upon applying power with the low speed gear in mesh the machine will pull out of the hole. The wrapping of chain affords traction not possible with the chains used about the circumference of the tires.

TESTS FOR MISFIRING.

It is often found difficult to locate the cause of misfiring when the engine is doing hard work, and generally the only certain thing to do is to search for all probable defects. If the misfiring is regular, one can easily determine which cylinder is not operating by grounding two spark plugs at the same time with screw drivers, and if the motor continues to miss when running on two cylinders, it is one of these two that is at fault. When the car is in motion this method is impractical, but one can operate the machine and yet make an effective test. One can slack off the joint between the exhaust pipe and the cylinders. As a result the exhaust will be distinctly audible when the engine is pulling. Each exhaust joint can be slackened off in turn and in this manner each cylinder tested separately as to its firing. If it is found that all the cylinders are apt to misfire, the trouble will probably not be found at the spark plugs.

NEED OF GARAGE VENTILATION.

Owners who complain of the cold and barn-like atmosphere of their garages and want to close all windows and doors, should understand the possibilities of danger from the fumes of gasoline or of the creation of carbon monoxide and dioxide if the engine is in operation. Numerous instances are known of men of strong vitality who have been asphyxiated, and men not as vigorous have been made ill by inhaling the noxious gases from the fuel and the exhaust.

All garages should be well ventilated and provision should be made to keep the air on the floor as well as at the ceiling in circulation. Many a man, when working under a car has complained of being sleepy and believes it to be caused by

lying on his back, a condition probably due to the influences of the gasoline vapor or the gas from the engine he is at work on.

SIMPLE TEST FOR WATER.

The use of hard water in the cooling system of a motor car is detrimental, as the fluid upon heating forms a boiler scale in the water jackets, which is deposited in the radiator in the form of fine, brick colored powder. This reduces the efficiency of the cooler and in time will clog the water passages.

A test to determine the condition of the water may be easily made with articles that any druggist keeps in stock. A few glass tubes or vials are all that are needed. Make a soap solution and fill a tube about half full. Then add a few drops of water to be examined. If the fluid is hard the solution will turn a milky color or curdle.

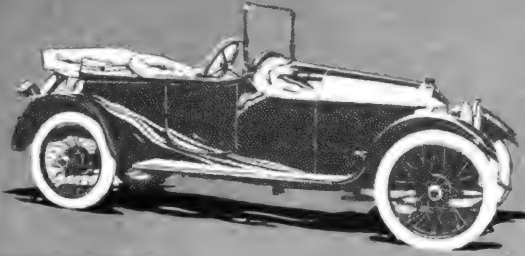
The presence of iron may be detected by adding one drop of ferrocyanide of potassium to a little of the water in a test tube. The fluid will turn blue if iron is present. At least once a week the radiator and water jackets should be flushed through with clean water.

RENOVATING FELT WASHERS.

Felt washers are used in numerous places about the car to prevent leakage of lubricant. Rear axles are usually so fitted to prevent the oil or grease from working out of the differential housing on to the wheels and brakes. In time the felt becomes hard, especially if it is in contact with a moving part. The material has then lost its elasticity and the lubricant will work out. Of course the best method to remedy this is to replace the old washers with new, but if the old ones have not worn too badly, they may be renovated by soaking in gasoline. In fitting new felt washers they should not be too snug as the part is very likely to become worn.

STARTING WITHOUT A CRANK.

When the crank is detachable from the car it may be lost. On light and medium weight cars an easy way to start the car without the use of a crank, if this is necessary, is to jack one of the rear wheels and place the motor in high gear. By turning the jacked wheel forward the motor will be started just as if the crank had been used. The wheel will, of course, spin, but by placing the gear shift lever at neutral it will stop.



Exclusive

The one light car that has all the luxury, beauty and high class of the most expensive heavy cars is the Scripps-Booth.

It is the one light car that Madame or Mademoiselle can drive with pride.

It is the one light car that the prosperous business man can afford to drive.



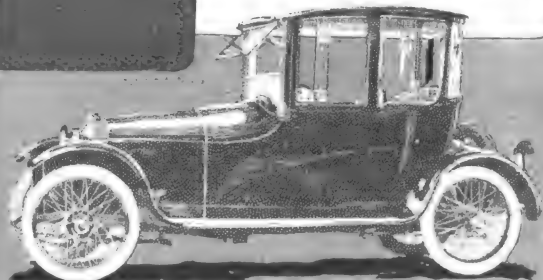
Scripps-Booth

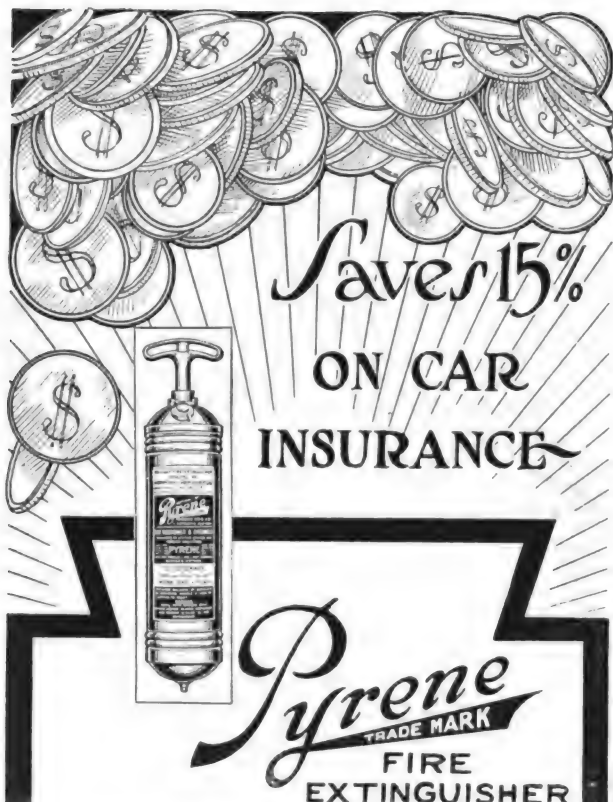
cars offer everything in motor car perfection, refinement and luxury in light weight.

To see the car is to acknowledge its exclusiveness.

To ride in it is to appreciate its mechanical perfection.

Scripps-Booth Co.
Detroit, Michigan





**Saves 15%
ON CAR
INSURANCE**

Pyrene
TRADE MARK
FIRE
EXTINGUISHER

PROTECTS LIFE—PROPERTY

Insurance Companies give a discount of **15 per cent.** from the amount of car fire insurance premiums if machines are PYRENE equipped.

PYRENE FIRE EXTINGUISHERS are a constant protection for passengers and a safe guard against damage and property loss by fire.

PYRENE FIRE EXTINGUISHERS

are a motor car economy, will serve efficiently and for long periods. Dependable, of small size, conveniently carried, easily operated and instantly available when needed.

PYRENE brass and nickel plated fire extinguishers, one quart capacity are included in the lists of approved fire appliances issued by the National Board of Fire Underwriters.

PYRENE COMPANY OF NEW ENGLAND
88 Broad Street BOSTON, MASS

TRADE MARK REGISTERED IN
NON-FLUID OIL
UNITED STATES PATENT OFFICE



Recognized as the **highest grade** lubricant on the market. Consistently retains the patronage of the great majority of car owners who **know** that the **best** lubricant is the **cheapest**, because it protects their car investments **most surely**.

Automobile manufacturers recommend it. Try it out on your own car.

"K. No. 00 Special" grade, for sliding gear transmission.

"K. No. 000" for differential, compression cups and all bearings.

Reduced prices for 1915. Ask your dealer.

Sold by leading dealers everywhere. Look for the orange-colored can bearing sprocket-wheel trade-mark shown above.

New York & New Jersey Lubricant Co.
165 Broadway, New York. 1430 Michigan Ave., Chicago, Ill.



WHY USE INFERIOR PLUGS WHEN CENTERFIRE

can be bought at the same price? They overcome all Engine troubles, fire where others fail and Add Power to engine. Any length point desired made to order. Try them and you will use them—always. Make a trial and save money. \$1.00 each, 6 for \$5.00.

GUARANTEED

Agents wanted and special prices to dealers.

Milwaukee Auto Specialty Co.
705-707-709-711 Chestnut St., Milwaukee, Wis.

Why Pay Excessive Hotel Rates?

THE NEW AMSTERDAM

Euclid Avenue at 22nd Street, CLEVELAND, OHIO

A five minutes walk from the active centres, yet overlooking the most beautiful residence section of Cleveland.

"The logical resting place for tired Tourists."

Large airy suites of from two to five rooms (also single rooms.)

GARAGE NEARBY

RATES:—\$1.50 per day, each person
Dining Room Modified *a la Carte*

A. A. McCASLIN, Managing Director

L. McNAMARA, Manager

(When Writing to Advertisers, Please Mention The Automobile Journal.)

ENDURING PAPER GASKETS.

A suitable gasket for cylinder heads may be made in the following manner: Take heavy wrapping paper and cut a gasket of the required dimensions, which is then soaked in boiled oil for about 10 hours. It should then be hung up and allowed to drip, after which some flake graphite should be sprinkled on its surfaces. When used the gasket will afford a tight and durable joint.

REDUCING FILE TEMPER.

Many times a new file snaps into two pieces on the first application. The reason for this is that the steel is overtempered and consequently is brittle. A simple remedy to reduce the temper is to coat the file with oil and place in a fire. When the oil is all ablaze take the file and plunge it into cold water.

HEAT PROOF PAINT.

To make a good cylinder and exhaust pipe paint, use two pounds of black oxide of manganese, three pounds of graphite and nine pounds of Fuller's earth, thoroughly mixed, to which add a compound of 10 parts of sodium silicate, one part of glucose and four parts of water, until it is of such consistency that it may be applied with a brush.

BLACK FINISH FOR BRASS.

Many car owners prefer a black finish to brass. For those who have brass fittings and would prefer to have them black, the following formula is very practical. Thoroughly clean and polish the articles, then immerse in a solution of chloride of antimony for a short period, dry over a spirit lamp and then brush with a black lead brush.

STEEL SOLDERING SOLUTION.

A soldering solution for steel that will not rust or blacken the work is made of six ounces of glycerine and one ounce of oxide of zinc.

Clean Carbon From Cylinders

COMPLETE
GENERATING AND
DECARBONIZING
OUTFIT

\$15

Not too large for the small garage or shop, but large enough for any business a shop can do.

A complete equipment, fully guaranteed, and extremely economical to operate.

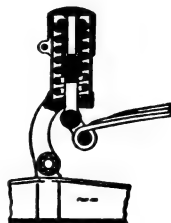
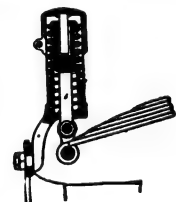
No tanks to handle, with material always ready, any person can use it and make money.

Will clean carbon from a cylinder in three minutes. Oxygen is generated in three minutes.

Saves time, labor and material, and does the best work science can conceive.

"O.G." Ford Shock Absorbers THE SET OF FOUR \$9

Can be attached in 15 minutes, are adjustable when attached, and are automatically adjusted by the load. Thoroughly lubricated by grease cups. No rattle or squeak. Sold with a guarantee for satisfaction during the use of the car, covering material, workmanship and complete absorption of shock. Purchase price refunded if not satisfactory. Method of attaching to rear spring of Ford car is shown by this illustration.



Extreme spring action with this absorber attached to the front spring is shown in this illustration of the manner of installation. The spring tension is adjusted by turning the cap, lessening or increasing the pressure.

No questions asked if refund is requested. The user is the one who must be satisfied.

Write today for Jobbers' and Dealers' Discount Sheets and Special Literature.

Oxygen Generator Co.
301 River Street TROY, N. Y.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

THE first day—orders for ten thousand; and an average of 2113 a day since. Without seeing a sample; no knowledge save the bare announcement! This is the trade's confidence in Klaxon!

The name that can accomplish this is valuable. We would not take a million dollars for it. Yet the Klaxon name is valuable only because of the Klaxon *quality* that it stands for. If we should put it on an inferior signal, this reputation for quality would be ruined and the name would be valueless.

If the Hand Klaxonet were not superior in every feature to the hand signals in its class, obviously we could not afford to bring it out nor back it with the Klaxon permanent guarantee.

Deliveries May 1st.

LOVELL-McCONNELL MFG. COMPANY :: MAKERS OF THE KLAXON :: NEWARK, N. J.



The Hand Klaxonet

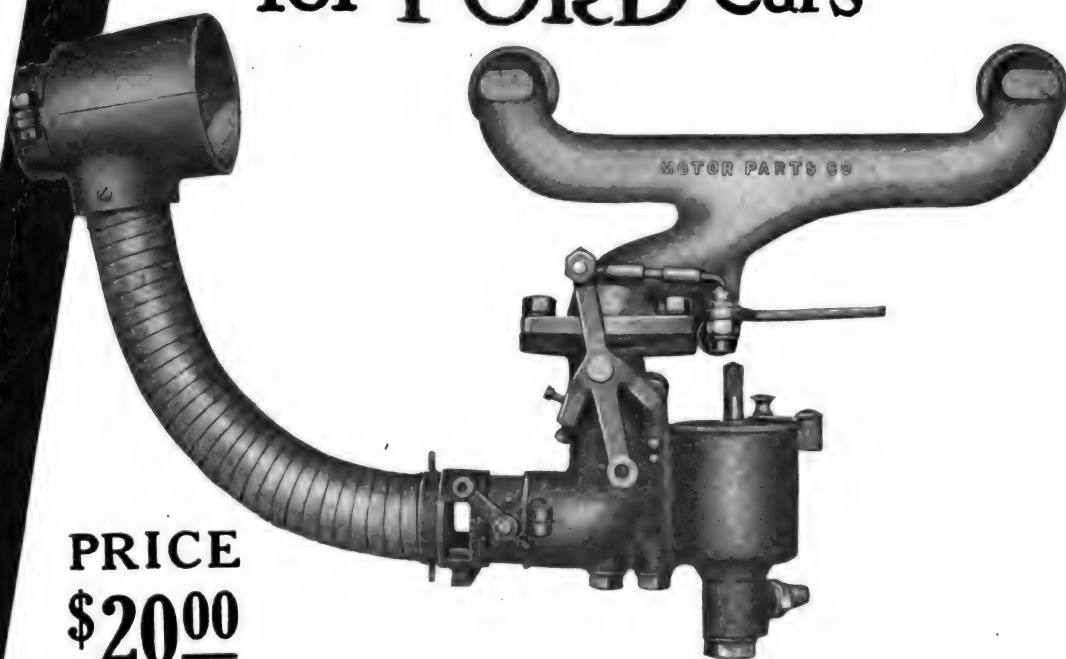
This advertisement planned, written and set up entirely in the Klaxon factory. Type composition by the Klaxon Press with Klaxon type specially designed by Goudy

(When Writing to Advertisers, Please Mention The Automobile Journal.)

ZENITH

CARBURETORS

for FORD Cars



PRICE
\$20⁰⁰

complete
as shown.
At any
garage
or at the
Motor Parts
Branches.
Can be
installed
very quickly
by anyone.

THE famous Zenith means much additional power with more miles per gallon. It means a big improvement in the smoothness of the motor, a snap and response which the Ford owner will brag about.

The Zenith has no valves or springs or cams. It has no adjustments to be altered from the exact setting your car requires. The universal carburetor of Europe is now ready for the universal car of America.

MOTOR PARTS CO. Distributors

Philadelphia, Boston, Springfield, Mass., Buffalo, N. Y.

NEW DEPARTURE BALL BEARINGS

American Made for American Trade

THROUGHOUT the motor car, wherever a bearing is required, in the motor, gearset, differential, front or rear axle, there is a Guaranteed New Departure Ball Bearing ready for service.

These quality bearings are immediately available in quantity at our works in Bristol, and the excellence of our service is such, that ample stocks are now carried at our branch in Detroit and by New Departure Distributors throughout the United States.



Distributors:

ALBANY	Albany Hardware & Iron Co.	
ATLANTA	Elyea-Austell Co.	
BALTIMORE	The Reus Bros. Co.,	Mt. Royal Ave. & Cathedral St.
BOSTON	Ahlberg Bearing Co.,	93 Mass. Ave.
BUFFALO	Iroquois Rubber Co.,	379-383 Washington St.
CALGARY, ALB.		
CAN.,	The Chapin Co.	
CINCINNATI	Herman Bumiller Co.,	432 Main St.
CHICAGO	Ahlberg Bearing Co.,	2686 Michigan Ave.
	Chicago Pulley & Shafting Co.,	32-36 S. Clinton St.
	Ahlberg Bearing Co.,	1841 Euclid Ave.
CLEVELAND	Cray Brothers,	1111 West 11th St.
	Denver Auto Goods Co.,	1600 Broadway.
DENVER	Quinn & McGill Motor Supply Co.,	1582 Broadway.
	M. L. Foss,	1729 California St.
DES MOINES	Herring Motor Supply Co.,	912-14 Locust St.
DETROIT	Ahlberg Bearing Co.,	805 Woodward Ave.
INDIANAPOLIS	Hearsey-Willis Co.,	389 N. Capitol Ave.
KANSAS CITY,		
MO.	Motor and Machinists Supply Co.,	1519 Grand Ave.
LOS ANGELES	Ahlberg Bearing Co.,	325 W. Pico St.
	Western Rubber and Supply Co.,	1011 S. Olive St.
MILWAUKEE	Julius Andrae & Sons Co.,	358 Broadway.
MINNEAPOLIS	Hudson & Thurber Co.,	308 Third Ave. N.
NEW YORK CITY	Ahlberg Bearing Co.,	1790 Broadway.
	The Gwilliam Co.,	Broadway and 58th St.
NORFOLK	Cheml Company, Inc.,	438 Granby St.
OMAHA	The Lininger Implement Co.,	1101 Sixth St.
PASADENA	Western Rubber and Supply Co.,	55 W. Colorado St.
PHILADELPHIA	The Gwilliam Co.,	1314 Arch St.
PITTSBURGH	Machinists Supply Co.	
PORTLAND, ME.	James Bailey Co.,	18 Free St.
PORTLAND, ORE.	Ballou & Wright,	Broadway and Oak St.
RICHMOND, VA.	Cheml Company, Inc.,	689 E. Main St.
ROCHESTER	U. S. Rubber Co.,	24 Exchange St.
SACRAMENTO	Kimball-Upson Co.,	609-11 K. St., 608-15 Oak Ave.
SAINT LOUIS	Fred Campbell,	1109 and 3219 Locust St.
SALT LAKE CITY	Bertram Motor Supply Co.,	842 South State St.
SAN DIEGO	Western Rubber and Supply Co.,	1364 Fifth St.
SAN FRANCISCO	Irvin Silverberg & Co.,	541 Van Ness Ave.
	Western Rubber and Supply Co.,	149 New Montgomery St.
SAN ANTONIO	Woodward Carriage Co.,	Ave. C and Third St.
SEATTLE	Ballou & Wright,	817 E. Pike St.
SPOKANE	Child, Day & Churchill Co.,	1215 First Ave.
SYRACUSE	U. S. Rubber Co.,	212 S. Clinton St.
TACOMA	Automobile Supply Co.,	755 South C St.
TAMPA	American Supply Co.,	610-20 Tampa St.
TORONTO	The Tire Import Co.,	130 Simcoe St.

THE NEW DEPARTURE MANUFACTURING CO.

Bristol, Connecticut, U. S. A.

Western Branch: 1016-17 Ford Building, Detroit, Michigan

VOL. XXXIX.

NO. 6.

AUTOMOBILE JOURNAL

\$1.50 the year
10 cents the copy

PAWTUCKET R.I.

April 25, 1915



**TECHNICAL COMMITTEE
OF
The Automobile Club of America**

CERTIFIED TEST No 15

This is to certify that the Technical Committee of the Pennsylvania Vacuum Cup Tires, manufactured by the Pennsylvania Rubber Company, has tested with the following results:

OUTSTANDING factors which enable dealers to meet conditions more advantageously than ever with PENNSYLVANIA OILPROOF

VACUUM CUP TIRES

First—the very moderate differential in price that now prevails between these and ordinary tires; made possible by the operation of our great new factory.

Second—the actual 50% increase in wear resistance which we have effected on 1915 V. C. Tires. This—remember—is over and above the quality that scored the unapproached average mileage of 6,760 miles in the 1914 Official Test by The Automobile Club of America—Covered by the famous Certificate No. 15.

Third—with the new increased wearing quality the absolute and guaranteed anti-skid efficiency takes on even increased importance. Absolutely oilproof, as ever, of course.

The V. C. Dealer has more than ever in his favor for going after the high class trade

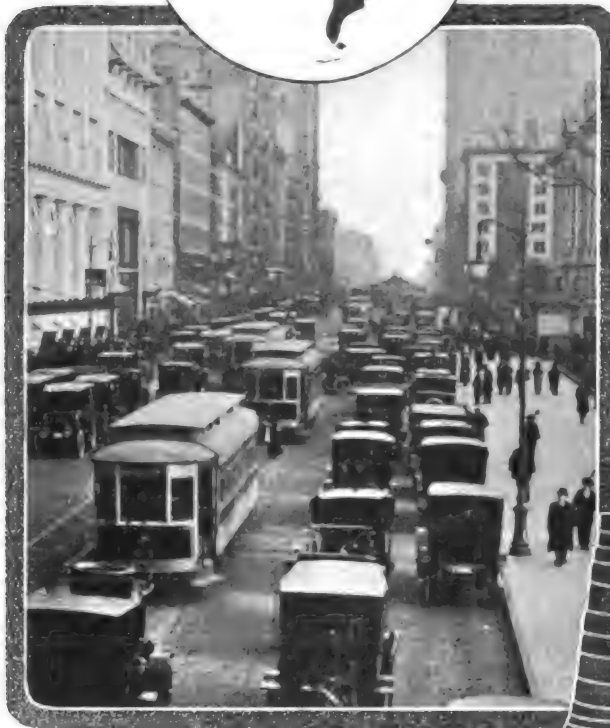
PENNSYLVANIA RUBBER CO., JEANNETTE, PA.

Atlanta	Cleveland	Kansas City, Mo.	Omaha	St. Paul
Boston	Dallas	Minneapolis	Philadelphia	San Francisco
Chicago	Detroit	New York	Pittsburgh	Seattle

An Independent Company with an Independent Selling Policy.

Raybestos

The universal use of this product has made its name the popular term for good brake lining.



Copyright, Underwood & Underwood
New York City
42nd Street looking East



Copyright, Underwood & Underwood
Paris, France
Scene on one of the Boulevards



Not only is RAYBESTOS used more extensively abroad than the best of foreign made brake linings but its quality and the superb service it gives has done much to wean European designers away from their original preference for metal to metal brakes.

In American non-technical motorists know what you mean when you speak of RAYBESTOS quicker than when you talk of brake lining. Perhaps this is one reason why our trade name as well as our product is so much imitated, but

*"They followed me and they copied me, but they couldn't copy my mind,
And I left them gasping and floundering, a year and a half behind."*

You can tell the genuine by its silver edges and the trade name RAYBESTOS stamped on every foot of it.

For sale by leading dealers everywhere.

THE ROYAL EQUIPMENT COMPANY

1378 Bostwick Avenue

Bridgeport, Connecticut



How a Spring Works

The trouble with a spring is that it springs back. There's nothing neutral about a spring under compression. Its tendency is to go back to its normal position altogether too quickly for comfort. There's enough power in a good spring, if it were used as a bow, to shoot you over a tree like an arrow. When four such springs rebound on a country road you suffer the sensation in a modified degree of being catapulted into the air.

The New Automatic Hartford Shock Absorber soothes the angry spring. When the spring is subjected to more than normal compression, the Hartford takes hold and eases it firmly, but gently, back to normal. No jar—no recoil—no stiffness—just an equalizing of spring action into long, undulating waves of motion.

★Hartford

SHOCK ABSORBER

Soothes the Angry Spring

The Hartford works progressively—automatically. When spring action is slight its touch is gentle but its control is firmer and firmer as spring action increases. This is accomplished by a series of internal discs, engaging progressively.

Hartford Shock Absorbers add immensely to the comfort of riding; they keep the wheels on the ground and thus prevent accidents; and they add to the life of machinery and tires.

Let us send you a book which will tell you why the Hartford Shock Absorber is standard equipment on so many prominent cars and why 95% of the racing drivers use it. The book is free.



Automobile Manufacturers are now using the finest springs that can be made. If you want more comfort, you must use Hartford Shock Absorbers.

Hartford Suspension Co.
147 Morgan St., Jersey City, N. J.

E. V. HARTFORD
President

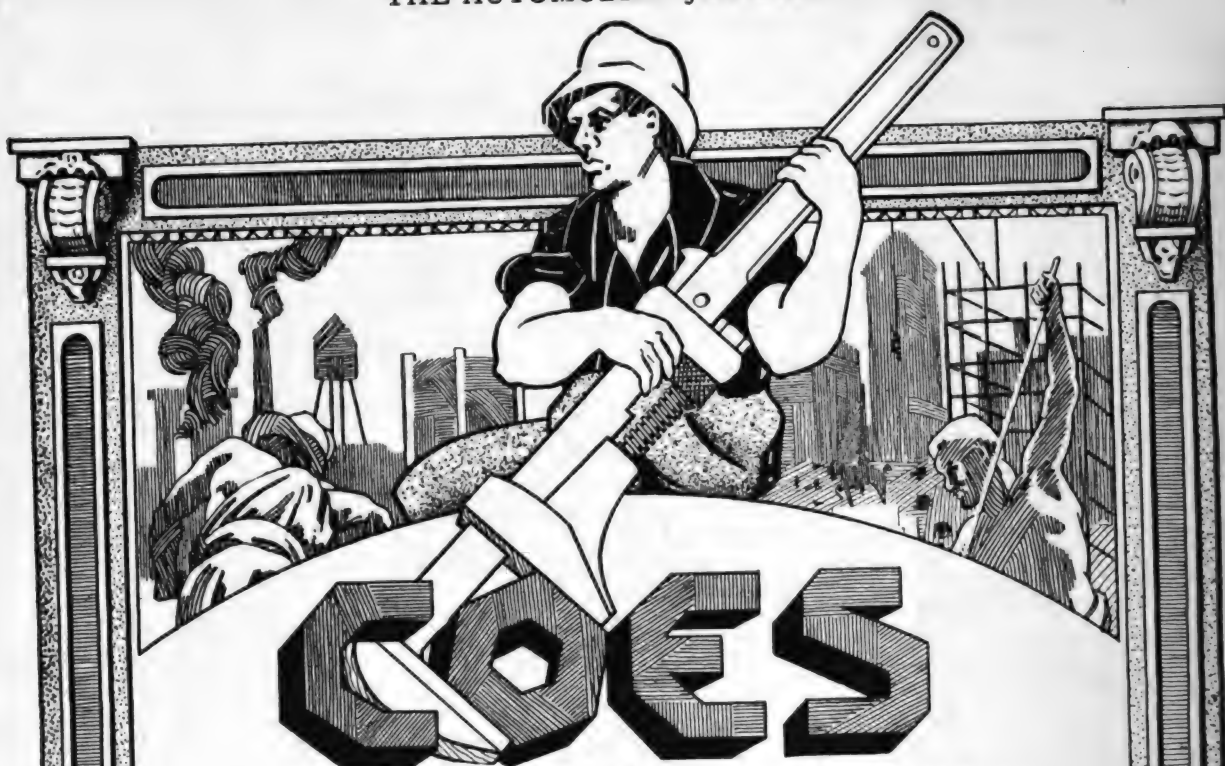
BRANCHES:

New York	Newark
Boston	Chicago
Philadelphia	Pittsburgh
Kansas City	Indianapolis

* Formerly Truffault-Hartford

**Makes
Every Road
a Boulevard**

(When Writing to Advertisers, Please Mention The Automobile Journal.)



**Wrenches Are Made Right, Stay Right,
Last a Lifetime, and are 30% Stronger
Than Any Other.**

**"COES" on any Wrench Means Quality,
Best Material and Finest Workmanship.
An Inspected and Tested Wrench. The
Ironclad "COES" Guarantee for Strength
and Finish.**

**The "COES" Automobile Model are for Motorists
and Repairmen. For Service Specify "COES" No
Tool Kit or Repairshop is Complete Without One.**

**Ease of Handling Without Fear of Slipping or Bruis-
ing. Perfect Balance and Certain Grip has made the
"COES" the Most Widely Used Tool of the Kind in
the World.**

COES WRENCH CO.

WORCESTER MASS.

J.C. McCARTY & CO.
JOHN H. GRAHAM & CO.

29 Murray St. New York City
113 Chambers St. New York City

When Writing to Advertisers, Please Mention The Automobile Journal.

Nothing Rolls So Easily As a Ball

That is why the American Made for American Trade New Departure Ball Bearing has the least friction under load



Showing frictional resistance between sliding plane surfaces.



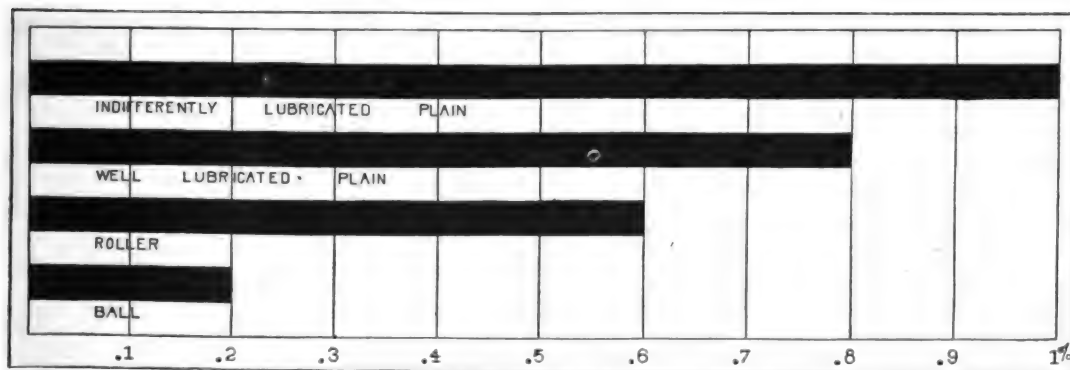
Showing difference between rolling and sliding friction.



Showing free movement and great reduction of friction

TRUE rolling motion is present in every New Departure. This insures that the balls roll in any desired direction without appreciable friction, and that any given area, on the surface of the balls under load, may not touch the other parts of the bearing for many hundred revolutions.

New areas, not mere points of contact, always come into action—This means that a New Departure is not subject to depreciation, due to wear being concentrated on definite areas of contact, revolution after revolution, as is always the case with bearings other than the ball type.



Graphical Diagram showing relative friction of various Bearing Types. Note the marked superiority of those using balls as the rolling elements

Send for our new catalog entitled "New Departure Ball Bearings and What They Mean to the Car Owner."

THE NEW DEPARTURE MANUFACTURING CO.

Distributors in Trade Centers Throughout the United States.

Bristol, Conn., U. S. A.

Western Branch
1016-17 Ford Building
Detroit, Michigan

When Writing to Advertisers, Please Mention The Automobile Journal.

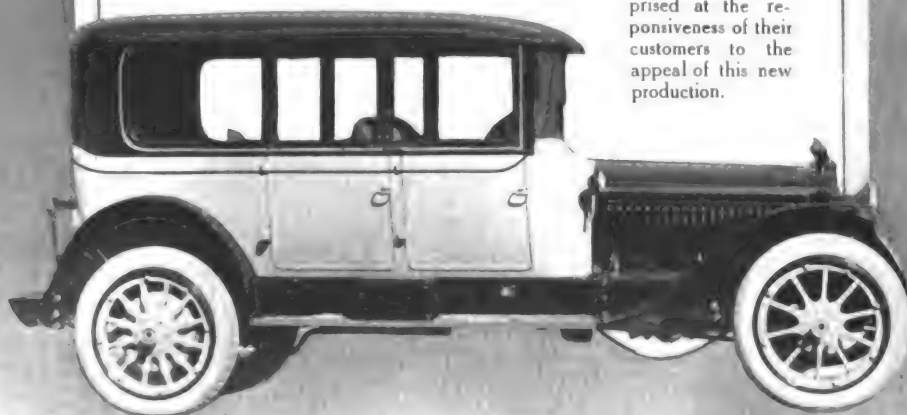
SPRINGFIELD CONVERTIBLE BODIES



THE limousine and the touring car are completely satisfactory only in certain seasons. The new Springfield Demi-Convertible body has no such limitations; it is the all-year, all purpose body.

More and more in America, as in Europe, the tendency is to demand protection from the sun, the dust and sudden showers even in touring. This body with its permanent top provides such protection, while it gives plenty of air and an unobstructed view. It may be converted into a limousine.

Dealers will be surprised at the responsiveness of their customers to the appeal of this new production.



SPRINGFIELD METAL BODY CO.
SPRINGFIELD, MASS.



A large circular graphic with a black background. At the top, the word "Pyrene" is written in a large, white, cursive script. Below it, "TRADE MARK" is written in a smaller, white, sans-serif font. In the center, the words "FIRE EXTINGUISHERS" are written in a bold, white, sans-serif font. Below this, the words "FOR PLEASURE CARS" and "COMMERCIAL VEHICLES" are written in a white, sans-serif font. In the center of the circle is a detailed illustration of a Pyrene fire extinguisher. To the left of the extinguisher, the word "SAVE" is written in a large, white, sans-serif font. To the right, "15%" is written in a large, white, sans-serif font. At the bottom of the circle, the words "SAFETY" and "PROTECTION" are written in a white, sans-serif font, separated by a horizontal line.

OF THE FIRE INSURANCE COST ON CARS AND TRUCKS

That saving is important to you. Why overlook it? Why waste money you might keep? The wise man stops the little leaks.

But the *meaning* of the saving is more important still. Your insurance company deducts 15 per cent. from your premium when you buy a *Pyrene* extinguisher for just one reason:

The National Board of Underwriters—the best informed men in the world on fire protection—have investigated Pyrene Extinguishers and KNOW that they prevent fires.

STOP THE FIRE AT THE START!

That's better than waiting several weeks without service from your car or truck while waiting for parts and repairs. Pyrene extinguishers are "Safety First" protection for your garage and buildings. They save life and property.

Write today for details.

PYRENE COMPANY OF NEW ENGLAND, 88 Broad St., Boston, Mass.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Index to Advertisers.

	Page		Page
Ahlberg Bearing Co.....	74	Valvoline Oil Co.....	74
Alsten & Goulding Co.....	68	Vanderpool Company, The....	6
Barrett Manufacturing Co....	68	Weed Chain Tire Grip Co....	14
Bosch Magneto Co.....	7		
Boyd, F. Shirley.....	69		
Braender Rubber & Tire Co..	68		
Coes Wrench Co.....	2		
Continental Asbestos Corp....	72		
Corbett & DeCoursey Co....	6		
Culver Stearns Mfg. Co....	72		
Dixon Crucible Co., Jos.....	69		
Dover Stamping & Mfg. Co....	76		
Eagle Oil & Supply Co.....	6		
Elsemann Magneto Co.....	76		
Garford Mfg. Co.....	70		
Goodyear Tire & Rubber Co..	78		
Harris Oil Co., A. W.....	68		
Hartford Suspension Co....	1		
Heinze Electric Co.....	69		
Hotel Longacre.....	70		
Hotel New Amsterdam.....	78		
Hotel Tuller.....	72		
Inter-State Motor Co.....	69		
Johnson, S. C. & Son.....	65		
Longacre Hotel.....	70		
Marburg Bros.....	74		
Mayo Mfg. Co.....	77		
Mea Magneto Co.....	74		
Meder Staudt Co., Inc.....	6		
Metz Company.....	76		
Miller Rubber Co.....	71		
Mossberg Co., Frank.....	59		
Motor Parts Co.....	72		
New Amsterdam Hotel.....	78		
New Departure Mfg. Co.....	3		
Nordyke & Marmon.....	70		
N. Y. & N. J. Lubricant Co..	78		
Oxygen Generator Co.....	79		
Peerless Motor Car Co.....	72		
Penn. Rubber Co.....	Cover		
Pyrene Co. of N. E.....	5		
Pierce-Arrow Motor Car Co..	Cover		
Royal Equipment Co.....	Cover		
Scripps-Booth Co., The.....	75		
Splittorf Electrical Co.....	74		
Springfield Body Co.....	4		
Standard Oil Co.....	73		
Standard Woven Fabric Co..	Cover		
Staybestos Mfg. Co., The....	67		
Stutz Motor Car Co.....	11		
Superior Mfg. Co.....	70		
Texas Co., The.....	13		
Thermoid Rubber Co.....	69		
Times Square Automobile Co.	6		
Tuller Hotel.....	72		

AGENTS WANTED

To sell Electric Vulcanizer operating on 6-volt storage battery. New idea. Quick seller. Every owner buys. Absolutely guaranteed. Can make \$50 weekly. Exclusive territory to producers. Corbett & DeCoursey Co., Pittsburgh, Penn.

WANTED:

Experienced Storage Battery Salesman to solicit local trade. Write giving full details, also salary. Storage Batteries, care Automobile Journal Publishing Company, Pawtucket, R. I.

FOR SALE.

Shop Vulcanizer, Bargain. Vanderpool, Springfield, O.

We sell everything pertaining to the automobile at half regular prices. Send for our great "PRICE WRECKER" No. 5, containing 3000 auto bargains at cut prices. TIMES SQUARE AUTOMOBILE Co. World's largest dealers. S. W. Cor. 56th St. and Broadway, N. Y. 1210 Michigan Avenue, Chicago.

Accessory and Garage Journal

A Distinct Trade Publication

Guaranteed to Have an Exclusive Trade Reader Distribution of

20,000 Copies

Each Monthly Issue

Without a Competitor in Its Field

Detailed Advertising Information at Request

Accessory and Garage Journal
Times Building, Pawtucket, R. I.

IMITATED
BUT NOT
DUPLICATED

N
O
K
A
R
B
O
N

E
A
G
L
E
I
N
E

A
U
T
O
O
I
L

THE OIL THAT SUITS
AND DOES NOT SOOT.

Carbon in your cylinders means loss of power. Customers report 10,000 to 15,000 miles with no carbon troubles. A good motto: TRY ANYTHING ONCE. EAGLEINE NO-KARBON AUTO OIL is furnished in 1-5-10 gallon, 30 and 50 gallon Steel Drums with faucets for which no extra charge is made.

EAGLE OIL
AND SUPPLY CO.

104 BROAD STREET, BOSTON, MASS.

BOSCH for FORDS

A Necessity—Not a Luxury

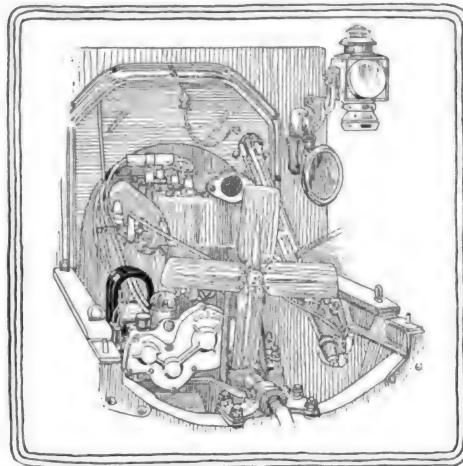
A SIMPLE SYSTEM
OF IGNITION

ONLY FOUR SHORT
CABLES

A DROP OF OIL
EVERY 1000 MILES
THE ONLY ATTENTION

THOROUGHLY RELIABLE

EXTRAORDINARILY
EFFICIENT



ELIMINATES THE
SPARK NUISANCE

ELIMINATES BOILING
OVER OF RADIATOR

ELIMINATES PUZZLING
IGNITION TROUBLES

ELIMINATES VIBRATION
FROM MISFIRING

ELIMINATES THE
ONE BIG WORRY OF
THE FORD CAR

The Bosch-Ford Attachment Installed

MOST Ford accessories now being offered to Ford owners are luxuries—something added for looks or extra comfort; that's why the average Ford owner isn't sold.

The Bosch-Ford Attachment is a **NECESSITY** for Fords—not a luxury. It is an accessory that becomes the most important part of the car; it is a necessity because it gets out of the car the life that is built into the car—life in the form of efficient service and without repair and replacement bills. It is an ignition system that employs the simple but efficient Bosch Magneto of world-wide fame.

The Bosch-Ford Attachment provides efficient and reliable ignition. The weak, irregular spark is no more. In its place occurs a big, fat, arc-like spark that not only gets every ounce of power out of the fuel but does so without straining the engine or car. Unlike other ignition systems, the Bosch Magneto creates its sparks so that each cylinder works in absolute time with every other—there are no uneven power strokes—there is no wear or tear, there is no more boiling over of the radiator.

You can have the same ignition system that was used by the winners of the 1915 Vanderbilt Cup and Grand Prize Races, if you fit a Bosch-Ford Attachment. Remember it's a **Necessity—Not a Luxury.**

—Write today for "The Key to Ford Efficiency"—

BOSCH MAGNETO COMPANY, 204 West 46th Street, New York
Service and Distributing Stations in Every State

Buyers' Reference and Guide.

ACCESSORY MANUFACTURERS AND JOBBERS.

Alsten & Goulding Co., Worcester, Mass.

Auto Parts Co., Providence, R. I.

Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.

Times Square Auto Co., 56th St., at Broadway, New York City.

AIR COMPRESSORS AND TANKS.

Brunner Mfg. Co., Main Office and Factory, Utica, N. Y.; New York Office, Hudson Terminal Bldg., 30 Church St. (Brunner.)

Williams Foundry & Machine Co., Akron, O.

ANTI-RATTLERS.

King Specialty Co., Brookline, Mass.

ARBOR PRESSES.

Bartlett, Edwin E., 322 A St., Boston. (Greenerd.)

AUTOMOBILE ACCESSORIES.

Gemco Mfg. Co., 743 So. Pierce St., Milwaukee, Wis.

AUTOMOBILE PARTS.

Gemco Mfg. Co., 743 So. Pierce St., Milwaukee, Wis.

AUTOMOBILES. (See Cars.)

AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

Motor Specialties Co., Waltham, Mass.

BALLS AND BALL BEARINGS.

Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1790 Broadway, New York City; 805 Woodward Ave., Detroit.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (R. I. V.)

Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)

New Departure Mfg. Co., Bristol, Conn. (New Departure.)

Norma Co. of America, 1790 Broadway, New York City. (Norma.)

BEARING METALS.

Bunting Bronze and Brass Co., 727 Spencer St., Toledo, O. (Bunting.)

BODIES—WOOD AND METAL.

Highland Body Mfg. Co., Cincinnati, O. (Highland.)

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

BRAKE BANDING OR LINING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Multibestos.)

Royal Equipment Co., 1378 Bostwick Ave., Bridgeport, Conn. (Raybestos.)

Standard Woven Fabric Co., Framingham, Mass. (Multibestos.)

Staybestos Mfg. Co., Lena and Armat Sts., Germantown, Philadelphia, Penn. (Staybestos.)

Thermoid Rubber Co., Trenton, N. J.

BRUSHES, WIRE.

Williams Foundry & Machine Co., Akron, O.

CABLE, AUTOMOBILE.

Packard Electric Co., The., Warren, O.

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARBURETORS.

Air-Friction Carburetor Co., Dayton, O. (Model C.)

Findelsen & Kropf Mfg. Co., 2127 Rockwell St., Chicago. (Rayfield.)

Zenith Carburetor Co., Detroit. (Zenith.)

CARS—GASOLINE PLEASURE.

Inter-State Motor Co., 804 West Willard St., Muncie, Ind. (Inter-State.)

Metz Co., Waltham, Mass. (Metz.)

Nordyke & Marmon Co., Indianapolis. (Marmon.)

Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Salvador Motor Co., Farragut Bldg., Massachusetts Ave., Boston. (Salvador.)

Scripps-Booth Co., Detroit. (Scripps-Booth.)

Studebaker Corp., Detroit, Mich. (Studebaker.)

Stutz Motor Car Co., Indianapolis. (Stutz.)

White Co., Cleveland, O. (White.)

Willys-Overland Co., Toledo, O. (Overland.)

Winton Motor Car Co., 131 Berea Road, Cleveland, O. (Winton.)

CARS—GASOLINE COMMERCIAL.

Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)

Chase Motor Truck Co., 106 West St., Syracuse, N. Y.

Duplex Power Car Co., Charlotte, Mich. (Duplex.)

Federal Motor Truck Co., Junction and Leavitt Sts., Detroit. (Federal.)

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

Independent Motors Co., Port Huron, Mich. (Independent.)

Jeffery Co., Thos. B., Kenosha, Wis.

Lauth-Juergens Motor Car Co., Fremont, O. (Fremont-Mais.)

Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Sanford Motor Truck Co., Syracuse, N. Y. (Sanford.)

Signal Motor Truck Co., Detroit. (Signal.)

Studebaker Corp., Detroit, Mich. (Studebaker.)

Sullivan Motor Car Co., Rochester, N. Y. (Sullivan.)

White Co., Cleveland, O. (White.)

CARS—ELECTRIC COMMERCIAL.

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

CEMENTS.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y. (Sta-Fix Radiator Mend.)

CHAIN LUBRICANTS.

Motor Accessories Inc., 749 A Boylston St., Boston. (Chain-Lub.)

CHAINS, TIRE AND ANTI-SKID-DING DEVICES.

Weed Chain Tire Grip Co., 28 Moore St., New York. (Weed.)

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

CIGAR LIGHTERS. (See Lighters.)

COILS.

Heinze Electric Co., Lowell, Mass.

CONTROLLERS.

Pierce Speed Controller Co., Anderson, Ind.

CRANK HOLDERS.

King Specialty Co., Brookline, Mass. (King.)

CYLINDER CLEANING COMPOUND.

Bowling Green Sales Co., 42 Broadway, New York City.

Dyer Apparatus Co., Cambridge, Mass. (Oxy-Carbon.)

DRESSINGS, TOP AND LEATHER.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

ELECTRIC LIGHTING EQUIPMENT.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FAN BELTS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

FIRE EXTINGUISHERS.

Pyrene Co. of N. E., 88 Broad St., Boston.

FORD AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

FORD STARTERS.

Hunter Auto Supply Co., Hunter Bldg., 333 W. Madison St., Chicago, Ill. (Hunter.)

FUNNELS, AUTO.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GEAR SETS.

Detroit Radiator Spec. Co., 961 Woodward Ave., Detroit, Mich.

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind. (Ross.)

GENERATORS.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Oxygen Generator Co., 301 River St., Troy, N. Y.

HEADLIGHT DIMMERS.

Chaney Co., L. F., Springfield, O. (Chaney.)

HEATERS.

Superior Mfg. Co., N. S. Pittsburg, Penn. (Superior Safe Garage.)

HORNS.

Garford Mfg. Co., Elyria, O. (Tuto.)

Lovell McConnell Mfg. Co., Newark, N. J. (Klaxon.)

INSULATION.

Packard Electric Co., The, Warren, O.

JACKS.

Motor Specialties Co., Waltham, Mass. (Excel Auto.)

LAMPS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric Trouble.)

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Clamp.)

LEATHER GOODS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

LIGHTERS, CIGAR.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)

BUYERS' REFERENCE and GUIDE—Continued.**LIGHTING SYSTEMS, ELECTRIC.**

Carleton Co., The 172 Summer St., Boston. (New Carleton No. 68.)
Garford Mfg. Co., Elyria, O. (Dyna-lux.)

Malton Specialty Co., 775 Boylston St., Boston, Mass.

LUBRICANTS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)

Continental Asbestos Corp., Worcester, Mass. (Spedolene.)

Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)

Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagleine No-Karbon.)

Harris Oil Co., A. W., 326 So. Water St., Providence, R. I.; 143 No. Wabash Ave., Chicago. (Harris.)

New York Lubricating Oil Co., 116 Broad St., New York City. (Monogram.)

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MotoRol, Non-Fluid, Kelex.)

Standard Oil Co., New York. (Polarine.)

Texas Company, 17 Battery Place, New York City. (Texaco.)

Vacuum Oil Co., Rochester, N. Y. (Gargoyle Mobiloil.)

Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETO COVERS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.

Elsemann Magneto Co., 32 33d St., Brooklyn, N. Y. (Elsemann.)

Heinze Electric Co., Lowell, Mass. (Heco.)

Marburg Bros., 1790 Broadway, New York. (Mea.)

Splitdorf Electrical Co., 98 Warren St., Newark, N. J.

MAILING LIST.

Trade Circular Addressing Co., 166 W. Adams St., Chicago.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

MOTORS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Michigan.)

Wisconsin Motor Mfg. Co., Milwaukee, Wis.

MOTOR STARTERS.

Automatic Appliance Co., 172 Columbus Ave., Boston. (Boston.)

PATCHES, TIRE.

Braender Rubber & Tire Co., Ruth-erford, N. J. (Cementless.)

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

POLISH.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

PRESSES. (See Arbor Presses.)**PUMPS, TIRE.**

Kellogg Mfg. Co., Rochester, N. Y. (Kellogg.)

PUMPS, VALVE.

Hill Pump Valve Co., Chicago, Ill.
RADIATOR CEMENT. (See Ce-ments.)

REAMERS.

Harding Distributing Co., Boston. (Martell Aligning.)

RINGS. (See Piston Rings.)**ROAD BUILDING MATERIALS.**

Barrett Manufacturing Co., New York. (Tarvia.)

ROLLER BEARINGS.

Hyatt Roller Bearing Co., Detroit. (Hyatt.)

Norma Co. of America, 1790 Broad-way, New York City. (Norma.)

SEATS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Rac-ing.)

SEAT COVERS.

Perkins-Campbell Co., 622 Broad-way, Cincinnati, O.

SELF-STARTERS. (See Motor Starters.)

SHOCK ABSORBERS AND SUP-PLEMENTARY SPRINGS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Sager Peerless.)

Hartford Suspension Co., 147 Morgan St., Jersey City, N. J.

Oxygen Generator Co., 301 River St., Troy, N. Y.

Perkins-Campbell Co., 622 Broad-way, Cincinnati, O.

SPARK PLUG CASES.

Perkins-Campbell Co., 622 Broad-way, Cincinnati, O.

SPARK PLUGS AND IGNITERS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)

Bosch Magneto Co., 223-225 W. 46th St., New York.

Heinze Electric Co., Lowell, Mass. (Heco Priming.)

Milwaukee Auto Specialty Co., 705-711 Chestnut St., Milwaukee, Wis. (Centerfire.)

Silvex Co., The, 171 Madison Ave., New York, N. Y.

Splitdorf Electrical Co., 98 Warren St., Newark, N. J.

Stonebridge Sales Co., 10 Wall St., New York, N. Y.

SPRINGS FOR AUTOMOBILE'SUS-PENSION.

Marburg Bros., Inc., 1790 Broad-way, New York. (Marburg-Hagen.)

Tuthill Spring Co., 776 Polk St., Chi-cago. (Titanic Unbreakable.)

SPROCKETS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

TEST CLIPS.

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Universal.)

THERMOS CASES.

Dover Stamping & Manufacturing Co., Cambridge, Mass.

TIMERS.

Motor Specialties Co., Waltham, Mass. (Bemus.)

TIME STAMPS.

Hoggson & Co., S. H., Thames Bldg., New York, N. Y.

TIRE ACCESSORIES.

Braender Rubber & Tire Co., Ruth-erford, N. J.

TIRE CHAIN GRIPS. (See Chains.)

TIRE PRESERVATIVES AND PRO-TECTORS.

Braender Rubber & Tire Co., Ruth-erford, N. J.

TIRE REPAIR EQUIPMENT.

Stevens & Co., 373 Broadway, New York City. (Sampson Inner Tube Plug and Outfits.)

TIRES, CASINGS AND INNER TUBES.

Braender Rubber & Tire Co., Ruth-erford, N. J. (Braender.)

Federal Rubber Mfg. Co., Milwau-kee, Wis. (Federal.)

Goodyear Tire & Rubber Co., Madl-son St., Akron, O.

Miller Rubber Co., Akron, O. (Mil-ler.)

Polack Tyre & Rubber Co., 246 W. 59th St., New York City. (Polack.)

TOPS AND ATTACHMENTS.

Highland Body Manufacturing Co., Station P, Cincinnati, O. (High-land Coupe.)

Springfield Metal Body Co., 20 Med-ford Ave., Springfield, Mass.

TRANSFORMERS.

Packard Electric Co., The, War-ren, O.

TRUCKS AND TRACTORS. (See Cars, Commercial.)

UNLOADERS.

Gallon Iron Works and Mfg. Co., 116 East Main St., Gallon, O. (Gallon Eclipse Portable.)

VALVE LIFTERS AND RESEAT-ERS.

Paro, H. G., Suite 718-719 Michigan Blvd., Bldg., 30 No. Michigan Blvd., Chicago.

VALVE TOOLS.

American Valve Tool Co., 589 Hud-son St., New York, N. Y.

VARNISHES, ETC.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

VULCANIZERS.

Mabey's Electric & Mfg. Co., Indian-apolis. (Mabey's Electric.)

Vanderpool Co., Springfield, O.

Williams Foundry & Machine Co., Akron, O.

WELDING OUTFITS.

Dyer Apparatus Co., Cambridge, Mass. (Dyer.)

Waterhouse Welding Co., 3 Pelham St., Boston, Mass.

WHEELS, WIRE.

Houk Mfg. Co., 1709 Elmwood Ave., Buffalo, N. Y. (Houk Detachable.)

WRENCHES AND COMBINATION OUTFITS.

Coca Wrench Co., Worcester, Mass.

Lane, Will B., 180 No. Dearborn St., Chicago. (Unique Ratchet.)

Mossberg Co., Frank, Attleboro, Mass.

NEW YORK,

CHICAGO,

BOSTON

DETROIT.

April 25, 1915.
Vol. XXXIX. No. 6.

Remittances:
Should be made by Check,
Draft, Postoffice or Express
Money Order, or Registered
Letter. Money enclosures
must be at sender's risk.

THE AUTOMOBILE JOURNAL

Published the
10th and 25th of Each Month.

Subscriptions:
The United States and Mexico,
the year, \$1.50; Canada and
Foreign Countries in Postal
Union, the year, \$2.00. Ten
cents the copy.

AUTOMOBILE JOURNAL PUBLISHING CO.

William H. Black, Treasurer.

Times Building, Pawtucket, R. I.

D. O. Black, Jr., Secretary.

Entered as second class matter, April 16th, 1906, at the Postoffice at Pawtucket, R. I., under the Act of Congress of March 3rd, 1879

PUBLISHER'S AND READERS' PAGE.

THE Ford Car Owners Department is receiving the unstinted indorsement of the thousands of Ford car owners numbered among the readers of the Automobile Journal. It is one of the largest sections in the magazine, and contains a great amount of information that the owner could obtain nowhere else in similar form. One of the features of the department is that descriptions and illustrations of the newest and most desirable accessories and equipment intended particularly for the Ford car are published with the general information of the section and not run haphazard, as is usual custom. It also will be noticed that the advertising matter that relates especially to Ford cars is located in the department, which is another arrangement that the editor felt his readers would appreciate. This is a co-operative department, and suggestions that the readers may have tending toward its development and perfection would be welcomed by the publisher.

The New Car Owners Department is the result of long consideration on the part of the editor. Though it has appeared but once, it is already evident that it fills a long-felt want. A great deal of effort is devoted to making it one of the most valuable sections in the magazine. The suggestions as to the care, the repair and the overcoming of minor troubles of the car, all of which is presented in easily understandable terms, is absolutely authoritative and dependable, as is the editorial descriptions of the accessories and equipment offered by manufacturers to make the car a pleasure instead of a device for labor. The publisher has in his long years of experience compiled several books which contain information invaluable to the new car owner and operator. These can be purchased direct by applying to this office, where detailed information will be supplied.

The General Mechanical Department is another feature of the Automobile Journal that has stood up under the test of time. Its contents are of interest

and value to all classes of car owners and drivers, as well as to the garage and repair man. The information contained therein is specially prepared by experts in their several fields of the automobile industry, and consequently is reliable.

New Accessories and Equipment is the significant title of another section of the magazine that warrants close examination by the readers. The accessories, etc., described therein are the latest and best devices placed upon the market. Frequently the reader can find information that will reimburse him for more than a year's subscription fee to the Automobile Journal. The markets of the country are carefully watched for new devices, and as soon as those of merit appear the department editor carefully analyses them and gives his editorial judgment for the benefit of subscribers.

The Annual Touring Number of the Automobile Journal will be issued July 10, as has been the custom in previous years, but in each issue leading up to that date will be found a vast fund of touring data of national scope. This issue begins with a very informative article relating to the transcontinental tour of the National Highways Association. This is only one of the many that will be featured in this magazine. The accuracy of the data is absolutely assured.

The May 25 Issue of the Automobile Journal will be the Indianapolis Speedway Racing Advance Number, and it will contain all the reliable information relating to the race of May 29, the drivers, the cars, etc., besides giving a resume of the preceding

events and other information that distinguished the racing stories of the Automobile Journal.

The Circulation of the Automobile Journal is national in its scope and the issues are distributed through news agencies. However, frequent inquiries lead the publisher to state that requests for back numbers and subscriptions can be sent direct to this office.

Partial Table of Contents.

*National Highway Transcontinental Tours	15
*Street Railway Buys 100 "Jitneys"	22
*Wireless Telegraph on Truck	23
*The Motor Car Abroad	24
*Electric Wheel Chairs Win Favor	26
*Car Accessories and Equipment	28
*General News of the Industry	31
*Four Types of Auburn 1915 Chassis	35
*Planning to Make Streets Safe	39
*Practical Motor Car Repairs	43
*New Patents for Automobiles	48
Coming Events	48
*Motorized Fire Fighting Apparatus	50
*Industrial Happenings and Comment	52
*Preparing for the Indianapolis Race	54
*Suggestions for the Ford Car Owner	57
*Model T Ford Converted to a Racytype	62
*Ford Car Accessories and Equipment	64
*Practical Facts for New Car Owners	66
*Readers' Queries	68

*Indicates article is illustrated.



H.C.S. Roadster—Four-Cylinder, \$1475



The Car of Proven Worth

No greater value is offered to the motorist than is found in the STUTZ.

They represent all there is in design, construction, equipment, finish, convenience and comfort.

In service they have speed, endurance and operating economy that is sought by every buyer.

Stutz Quality Insures the Greatest Measure of Satisfaction.

STUTZ quality is known the world over. It has been proven in the greatest racing events and in long and constant service.

FOUR-CYLINDER.

H. C. S. Roadster.....	\$1475
Beauregard	2000
Roadster	2000
Bulldog	2250
Touring	2275
Sedan	3675

SIX-CYLINDER.

Beauregard	\$2125
Roadster	2125
Touring	2400
Sedan	3800

There are STUTZ Agencies in All Principal Cities

STUTZ MOTOR CAR COMPANY
INDIANAPOLIS INDIANA

*A Few Words
About Trade
Advertising.*

A trade directory has features that commend it, but the Accessory and Garage Journal is more efficient in service. It reaches every manufacturer, sales agent, jobbing house, agent, representative, dealer and sales force 12 times a year, and is read each month by several, sometimes many, with each concern. Copy can be changed each month—trade directories are issued annually or quarterly.

The monthly circulation means eight times more distribution and if each copy is read by three persons—a low estimate—the aggregate is 24 times the total for the directory. But the trade directory is not read with care—it is referred to occasionally and the number of readers is not dependable. In this publication we give you free the best trade directory service known and the circulation of 20,000 a month is guaranteed.

Compare the service and cost of the Accessory and Garage Journal with any other form of trade publicity—then back this with our absolute guarantee as to what we accord advertisers in this magazine, the only straight Automobile Trade Paper published.

All Garages.

All Repair Shops.

All Dealers in Vehicles.

**All Dealers in Supplies, Fittings
and Accessories.**

**All Jobbers in Supplies, Fittings
and Accessories.**

**All Pleasure and Commercial
Vehicle Makers.**

**All Manufacturers in the Automobile
and Allied Industries.**

WRITE FOR PROOF

Accessory and Garage Journal

Times Building,

Pawtucket, R. I.

**100 Per Cent.
Quality and
Quantity
Circulation.**

TEXACO MOTOR OIL

23.7 Miles In Near-Zero Weather On One Gallon of Texaco Gasoline

SUCH was the record of an Oakland which, in a blinding wind recently made an economy run in Chicago under the sanction of the American Automobile Association. The following is from the Motor World's account of the run:—

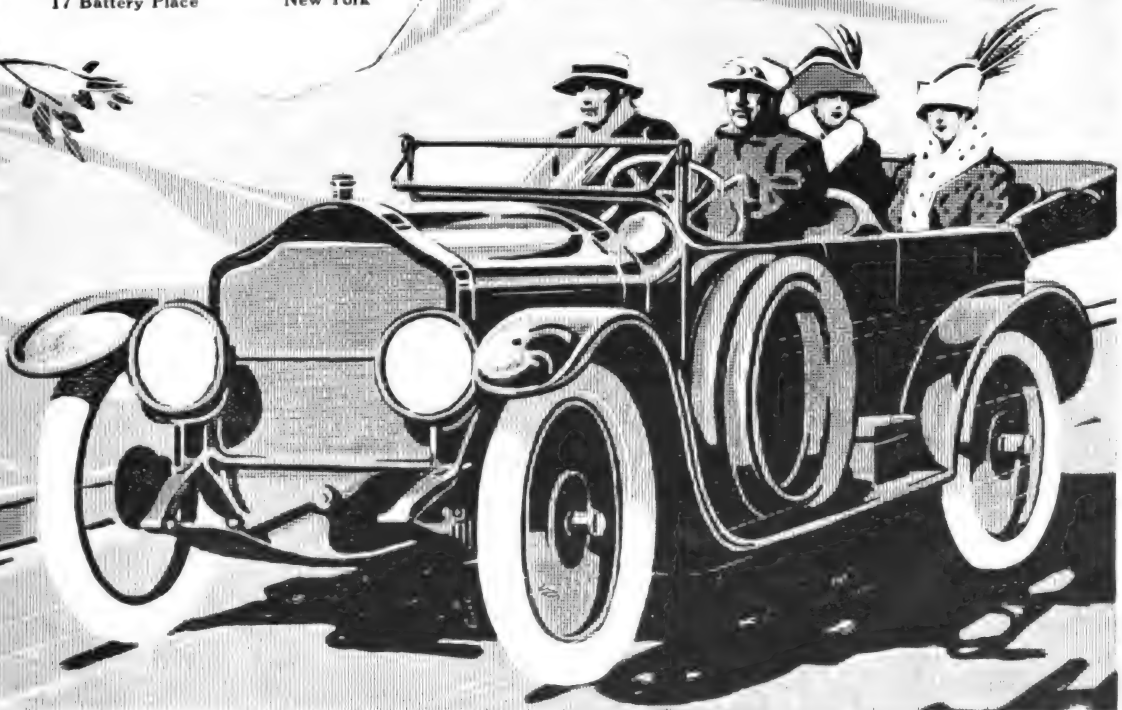
"The gasoline and oil used were supplied by The Texas Company, and according to official report, the fuel was 61.25 Baume gravity at 36 F. This would be 63.65 Baume at 60 degrees Fahrenheit.

The mercury during the run hovered between 5 and 8 degrees above zero, and an 18 mile wind was blowing from the northwest. (Greater part of route was in northerly or westerly direction). * * * * The Motometer showed only 10 degrees F. at the start and never indicated a water temperature of over 170 degrees."

When you buy Texaco Motor Oil and Gasoline you get exactly the same quality as used in this test. By their use you avoid carbon trouble, save gasoline and get the maximum power out of your motor.

Sold at good garages everywhere.

THE TEXAS COMPANY
17 Battery Place New York



(When Writing to Advertisers, Please Mention The Automobile Journal.)



Living it over Again

In a mental picture, he reviews the accident—the result of his recklessness

He realizes too late that it is *always foolhardy* to motor on slippery roads and streets without equipping all four tires with

Weed Anti-Skid Chains

The Only Real Safeguard Against Skidding

Strange, is it not, that some men laugh at peril—they do not seek to avoid danger—and they have no fear because they have no prudence.

They continue to motor over sleety, icy, or wet roads and pavements with "Foolish Dependence Upon Bare Rubber Alone" until a false turn—a sudden meeting at a corner—a slip or a skid—brings disaster as the punishment for their imprudence.

You motorists with reasoning brains put on your Tire Chains at the first indication of slippery streets, and the editors of the daily

newspapers are urging all motorists to follow your example.

For instance, the Public Ledger of Philadelphia, Pa., published by the owners of The Saturday Evening Post, in an editorial on August 1st, 1914, said that the simple adjuration to "Use Tire Chains on wet and slippery pavements" deserved to find its way into a law, and that law should by all means be enforced.

Promote "Safety First" in YOUR motoring circle—insist that everyone use Weed Chains on ALL tires.

Weed Chain Tire Grip Co., Bridgeport, Conn.

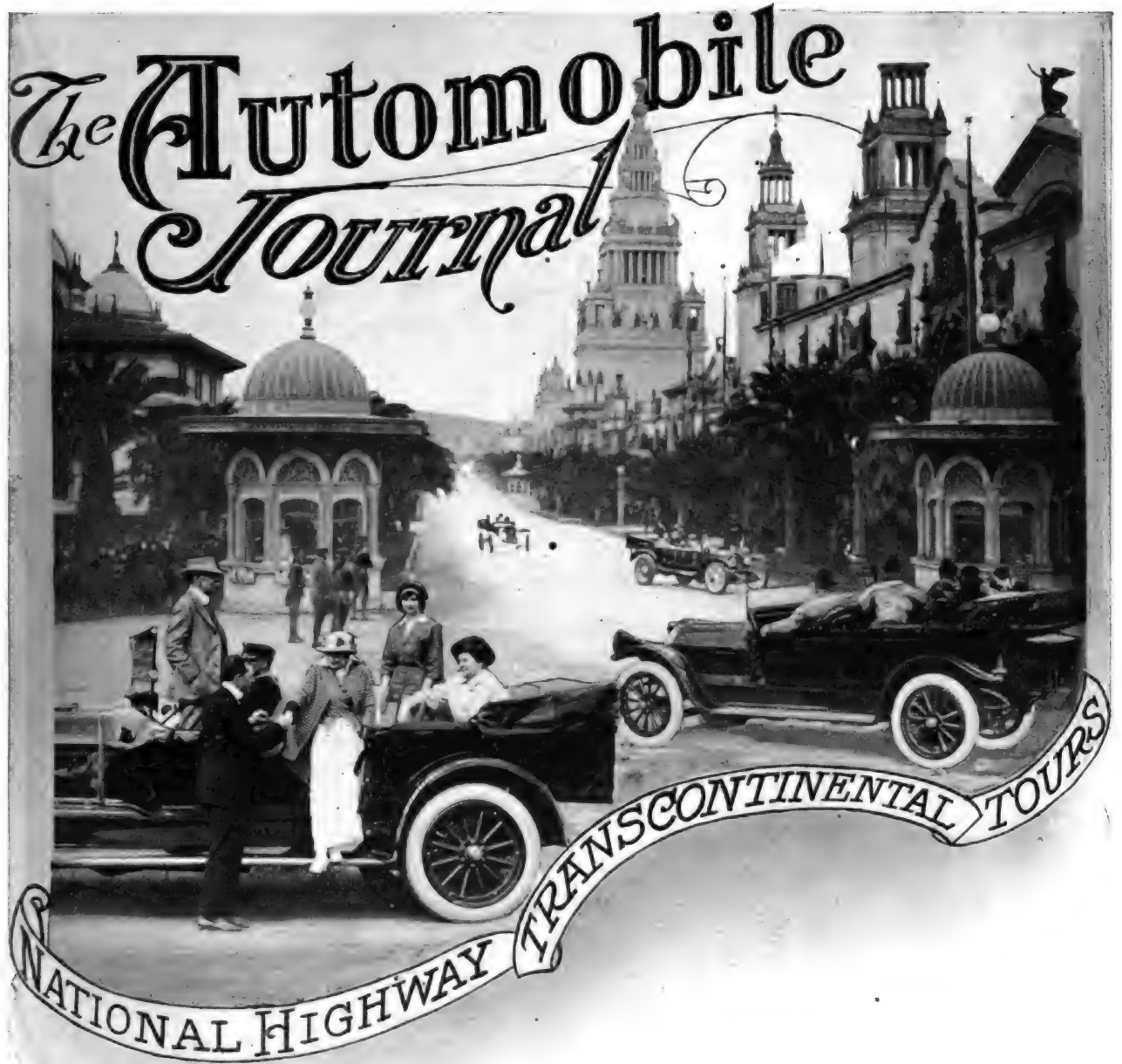
Also Manufacturers of Tire Chains and Lyon Grips especially constructed for Single and Dual Solid Truck Tires—Motorcycle Tire Chains, etc.

Manufactured for Canada by

DOMINION CHAIN COMPANY, Limited—Head Office: Shaughnessy Bldg., Montreal, Can.



When Writing to Advertisers, Please Mention The Automobile Journal.



TO DEMONSTRATE in a striking and interesting way the improvement which the last few years has brought about in American highways and American motor cars, a very remarkable tour from New York to San Francisco and return has been planned by the National Highways Association.

The party will leave New York, June 15, in large, high-power, seven-passenger touring cars, and will arrive in San Francisco, July 22. At Washington, Penn., the route of the Old Trails

road will be taken up. This is the first of the proposed transcontinental highways. It is extremely rich in scenic and historic interest and much development work has been done upon it. Returning, the party will cover the Lincoln Highway.

New Englanders who wish to take the tour will start from Boston on June 13 and from other New England points on corresponding dates. The route will run via Worcester, Springfield and probably Hartford and New Haven, arriving in

New York in time for the start of the main body on June 15. It is possible that the latter part of this trip may be made from Springfield via

Jacobs Ladder, Pittsfield, Albany and along the Hudson to New York.

There is no more important organization engaged in propaganda for good roads in America than the National Highways Association. Charles Henry Davis of Massachusetts is its founder and president and he has attracted to the organization the sympathy and active support of many influential and wealthy men. General Coleman du Pont, United States senator from Delaware



**Charles Henry Davis,
President.**

and chairman of the board of national councillors of the organization has been prominent in forwarding its purposes.

To a large extent the impressive demonstration of the improvement in American roads which the tour will constitute, will be also a demonstration of the success attained by the National Highways Association and its allied organizations in the work for which they were organized.

This is an exceptionally opportune time for a transcontinental tour on a grand scale. It will give the participants an opportunity to see the two great expositions under way on the Pacific coast and will aid materially in the "See America" movement which is very active just now and with which every good roads worker is in sympathy.

The tour, indeed, is sure to prove a great stimulus to touring all over the country. It will be one of the greatest events in the motor world for the year and will draw the attention of all American motorists in a striking way to the new possibilities in cross-country touring.

The exceptional talent and great resources of the National Highways Association for the formulation of touring plans have been fully devoted, under the direction of Presi-

dent Davis, to perfecting arrangements for the trip. These are unusual in many ways and provide the utmost in comfort and interest for the tourists.

Largest and Finest Cars Used.

The largest and finest touring cars of American manufacture will be provided in such number as is necessary to accommodate those who wish to make the trip. In each seven-passenger car only four passengers will be carried. A corps of especially efficient and careful drivers, experienced in cross-country touring, will be provided. Accommodations, including room and bath, have been reserved at all the night stops where they are available. So the trip will be accompanied by little of the hardships which were faced by the motorists who crossed the continent even as late as five years ago.

Transportation and sleeping accommodations, but not meals, are included by the fee set for the trip, which is \$780 per passenger. The tour is open to the public and not limited to members of any organization or organizations, but to assure the comfort of those who make the trip the number will be limited.

All preliminary arrangements have been executed by Elias Vander Horst, vice president and director in charge of the headquarters of the association at 18 Old Slip, New York. He will be in charge of the tour up to the moment of start-



The Delaware River Will Be Crossed at Trenton.

ing, at 12:30, June 15.

Everyone who goes on the trip will be made a member of the National Highways Association and will be supplied with a badge of the organization and copies of articles published by it. It is hoped in this way to add many recruits to the association who will thereafter actively support its work everywhere.



**Ellen Vander Horst,
Vice President.**

Arrangements have been made whereby road organizations along the route—state, county and local—will co-operate to make the trip a success and aid in the entertainment of the tourists.

After the tour gets under way it will be directed by A. L. Westgard, who is also a vice president of the association. Mr. Westgard is one of the best known men in the motor touring world. He has spent many years in road and map work, has crossed the continent in a motor car 10 times, and was famous for years as the official pathfinder who mapped out the routes of the Glidden tours.

Advice About Equipment Given.

Some interesting advice is given by the association regarding equipment which it is advisable to take. Each passenger is limited to one suit case in the way of baggage. If trunks are desired they must be shipped by railroad. Khaki or other thin and loose fitting material for suits and light shoes with canvas leggins are suggested for clothing. Shirts should be loose flannel or linen, with attached collars for the men, and dark shirtwaists should be worn by the ladies.

A linen duster is advised as an aid to comfort, thin gauntlets, caps with large visors for the men and veils with the ladies' hats. Amber glasses, not too dark, are advised to protect the eyes from the glare of the high lights in the southwest. A jar of cold cream and a good hair cleanser is desirable in the equipment for both sexes. Other items are thermos bottles, thin, water proof, light weight overcoats and a camera.

That an improvement over the

touring conditions of the recent years so great as to arouse marked enthusiasm for good roads, will be observed by the party is promised in the assurance given that the transcontinental trip has been freed from the very real hardships which were part of it in the recent past.

Only five years ago there were rough trails with unbridged streams and ravines, rocky and steep hills, poor or no accommodations for men or cars. And the trip was made in cars of untried design with unknown weaknesses. Today the association promises roads of fair and fast improving surfaces, bridges, culverts, easy grades, fair hotels and garages, plentiful supplies and thoroughly dependable motor cars.

The Old Trails road is the first of the transcontinental highways proposed. Last year \$2,000,000 was spent upon it and a like amount will be spent upon it during 1915. While a large proportion of the money used so far to improve the road has been spent on its eastern portions, a marked development has also taken place in the wider stretches through the West.

The Old Trails Road follows the old Na-



**A. L. Westgard,
Vice President.**



A Monument on the Gettysburg Battlefield.

tional pike built by the government from Washington to St. Louis. The first appropriations were made for it in 1806. The portion west of

Lick trail used by Daniel Boone, who is famous in American frontier history.

From Old Franklin via Kansas City to Santa Fe, New Mexico, it follows the Santa Fe trail, on which took place many bloody massacres by Indians of whites who were making the trip on wagons loaded with freight. This traffic was extremely heavy from 1822 to 1872 and there is still to be seen there parallel wagon ruts worn into the surface of the earth at that time.

Leaving Santa Fe and thence to the Pacific coast, the route runs along the Old Padres trail, followed by the San Franciscan fathers on their journeys to carry Christianity to the Puebla Indians and the Navajos of New Mexico and Arizona.

From New York to Philadelphia the route goes over good macadam roads and west of Philadelphia, along the Lancaster pike to the battlefield of Gettysburg, the roads are exceptionally fine. In addition to the historically interesting features of the trip there is some exceptionally fine scenery in crossing the Blue and Laurel ridges. The line to Pittsburg lies through Bedford and Ligonier. There are some steep hills surmounted by good roads on the short run from Pittsburg to Washington, Penn., where the route strikes the old National pike.

Macadam surfaces the roads from Washington, Penn., to Wheeling, W. Va., where the tour crosses into Ohio over the Ohio river. Straight west through Zanesville to Columbus there is a great deal of brick pavement, which is common on much travelled Ohio roads, and there are fine level gravelled roads from Columbus to Dayton and thence to Richmond, Ind., and Indianapolis. The gravel roads continue west to Terre Haute, but across the Illinois line there are stretches of clay to be encountered. Relieved by some stretches of pavement the clay continues until the Illinois line is passed at St. Louis.

Through Missouri concrete culverts and bridges have been put in preparatory to macadamizing the entire route. The party passes through Columbia, the seat of the state university. The Missouri river is passed on a steam ferry from Old Franklin to Booneville and thence the run is made via Arrow Rock, where there is a museum of frontier relics to Marshall. Another day's run is from Marshall via Independence to Kansas City.

The valley flats are followed between Kansas City and Lyons, Kan., passing through Emporia and Hutchinson. West of Lyons the graded roads are all natural dirt and follow the valley of the Arkansas river and the Santa Fe railroad via Great Bend, Dodge City, Garden City, Syracuse Las Animas to La Junta, Col.

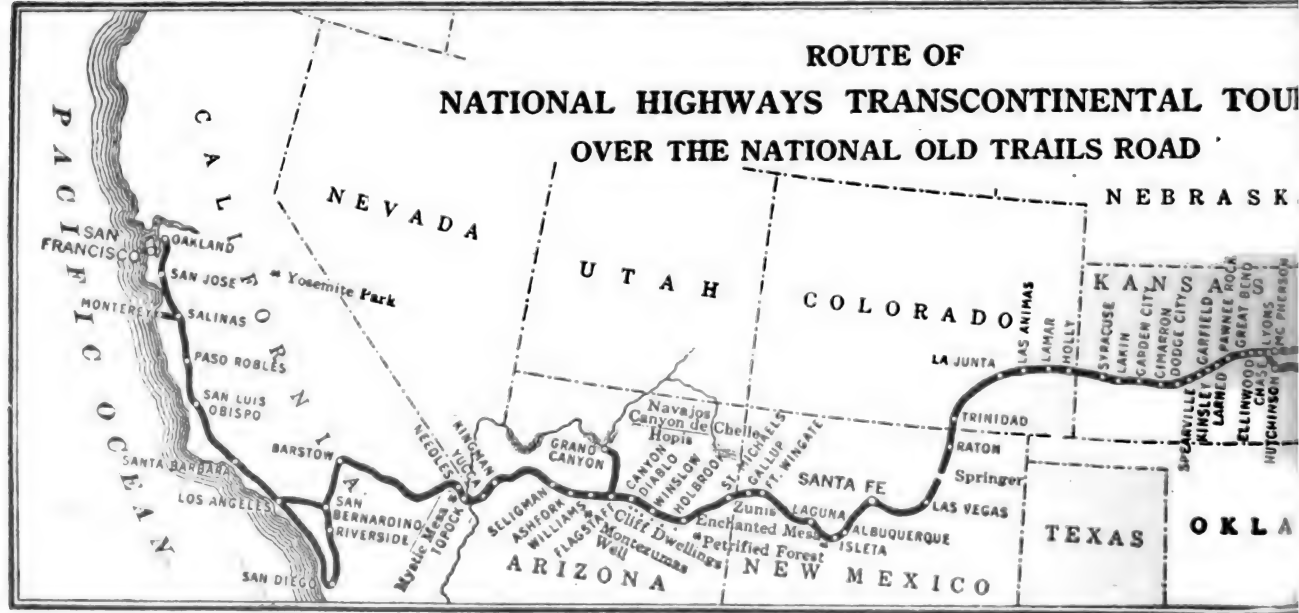
From La Junta the route goes southwest to Trinidad, through

DATES AND ITINERARY.

The itinerary of the trip and the hotels at which the party will be accommodated are shown in the following table. It will be noted that the best available accommodations have been procured in every city.
The party is to start from the headquarters of National Highways Association, 18 Old Slip, New York, June 15, at 12:30 P. M.

Date	Arrive At	Hotel
Tues. June 15	Philadelphia	Bellevue-Stratford
Wed. June 16	Gettysburg	Eagle
Thur. June 17	Pittsburg	Fort Pitt
Fri. June 18	Zanesville	Rogge
Sat. June 19	Dayton	Algonquin
Sun. June 20	Indianapolis	Claypool
Mon. June 21	Efingham	2 Hotels
Tues. June 22	St. Louis	Jefferson
Wed. June 23	Columbia	Hotel
Thur. June 24	Kansas City	2 Hotels
Fri. June 25	Emporia	Mitway
Sat. June 26	Hutchinson	Harvey
Sun. June 27	Dodge City	Harvey
Mon. June 28	Syracuse	Harvey
Tues. June 29	La Junta	Harvey
Wed. June 30	Raton	Seaberg
Thur. July 1	Las Vegas	Harvey
Fri. July 2	Santa Fe	De Vargas
Sat. July 3	Albuquerque	Harvey
Sun. July 4	Albuquerque	Harvey
Mon. July 5	Gallup	Commercial
Tues. July 6	Holbrook	2 Hotels
Wed. July 7	Flagstaff	Harvey
Thur. July 8	Grand Canyon	2 Hotels
Fri. July 9	Flagstaff	Harvey
Sat. July 10	Sellman	Brunswick
Sun. July 11	Kingman	Harvey
Mon. July 12	Needles	Harvey
Tues. July 13	Barstow	Mission Inn
Wed. July 14	Riverside	U. S. Grant
Thur. July 15	San Diego	
Fri. July 16	San Diego	
Sat. July 17	Exposition	Alexandria
Sun. July 18	Los Angeles	Potter
Mon. July 19	Santa Barbara	Andrews
Tues. July 20	S. Luis Obispo	
Wed. July 21	Monterey	Del Monte
Thur. July 22	San Francisco	

Marshall, Ill., was only surveyed and never constructed. From St. Louis to Old Franklin, across the river from Booneville, it follows the Boone



This Map Shows in Detail Route to Be Followed by Tour from New York to San Francisco, Including All Towns

a sparsely settled country over a road that recent improvements have made comfortable. West of Kansas City there are no paved roads until within 200 miles of the Pacific coast, except for small stretches about the larger cities. Improvements have been made, but they consist of grading and building bridges and culverts.

Leaving Trinidad the route runs down the vision past several coal mining camps and ascends the scenic road built by convicts of the Colorado prisons over the Raton Pass, from the summit of which a very fine view of the Rocky mountains may be had. The peaks of Dos Hermanos are visible to the west and to the northeast Flaher's peak, 10,000 feet high and with a curious flat top, may be seen. From the summit the road drops rapidly across the New Mexico line into the town of Raton, New Mexico.

Thence it follows the Santa Fe to East Las Vegas. Through this country the towns are of a distinctly Mexican character and Spanish is spoken chiefly, until Albuquerque is reached. From Las Vegas a new road runs through Romero pass, cutting across hills grown with cedar and passing through the Mexican village of Tecolote, where the river of the same name is forded and the town of Bernal, nestling at the foot of Starvation peak, is approached.

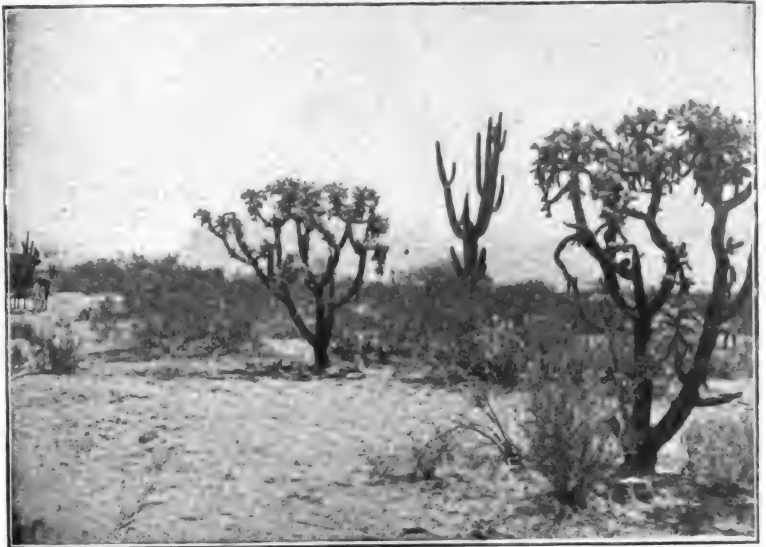
The country here is cedar grown. Near Rowe the old Pecos mission, said to date from 1520, is visible. The route passes through Apache canon and follows a safe road to Canoncito and across the hills to Santa Fe. Here are many interesting sights—the old palace of the Spanish governor, the old Exchange hotel, the oldest house in the United States, built in 1530; the San Miguel mission, the Cathedral and the plaza where Kit Carson made history.

South from Santa Fe a stop is made at La Bajada hill, from which a remarkable view over the mountains and the Rio Grande valley is obtainable. Near Domingo, on the main line of the Santa Fe, the road passes through a 40-foot cut in a gravel hill, which shows graphically what is being accomplished in the direction of perfecting roads throughout the West. At Albuquerque is the state university and a very interesting old Mexican town. The road follows the Rio Grande and crossing the quicksands of Rio Puerco it plunges into the real desert and runs along the base of precipitous and picturesque red cliffs, across the San Jose river to Laguna Pueblo—a well preserved specimen of Indian community houses. West of Laguna the route follows south of towering Mount Taylor, the Indian sacred mountain. Fort Wingate, a United States army post, is passed, and the road comes to Gallup, having crossed the continental divide.

Over the Arizona line a good road leads past the "Haystacks" monoliths and the Megaphone rock to St. Michaels. Here is the Navajo Indian reservation with an Indian school, a San Franciscan monastery and Day's Indian trading post. From Pinto the road passes through the petrified forest to Holbrook. A good road on which an iron bridge spans a deep chasm runs through the valley of the Little Colorado river from Holbrook to Winslow. From Winslow there is a newly graded highway which passes over a magnificent concrete bridge across the Canyon Padre to Flagstaff, nestling at the foot of the San Francisco peaks. There will be a side trip to the Grand Canon

of the Colorado. The last town in Arizona is Topock, where the road crosses a railroad bridge on planked ties. A fine road leads from there to Needles, Cal.

Following the railroad more or less closely a newly constructed highway leads from Needles 170 miles along the Mojave desert to Barstow, where a turn to the south is made and



Desert Vegetation in Arizona.

the descent begins along a splendid road through Cajon pass to San Bernardino. The desert is past and the fruit orchards stretch for miles in every direction. From San Bernardino the run is made via Riverside to the San Diego exposition.

Beyond San Diego the road is perfect. It is called El Camino Real and passes many fine old missions. North of Los Angeles it passes through several mountain passes in the coast range. And at last San Francisco and the Panama-Pacific exposition is reached.

While the splendid arrangements for the trip are the work of National Highways Association and the responsibility for its success rests on President Davis and his aids, all of the most



and Cities Through Which It Will Pass—It Coincides with Old Trails Road from Washington, Penn., Westward.

prominent good roads organizations in the country have indorsed it and are lending it their active co-operation.

efficient vice presidents. The route will give the tourist the best road conditions and hotel accommodations. An infinite variety of scenic and historic attractions will abound from start to finish. And not the least, the cause of good roads everywhere will be advanced by the participants, as well as their "Seeing America."



New Road Along Superstition Mountain, Arizona.

The most important of the organizations indorsing it are the National Oil Trails Road Association of Kansas City, Lincoln Highway Association of Detroit and the Automobile Club of California. The governors of the states through which the route passes, public officials and automobile clubs have all offered their hearty co-operation.

As the official expression of the National Highway's Association regarding the trip, President Davis has issued the following statement, which is indorsed by General du Pont:

To the people of the United States:

National highways and good roads everywhere as a result thereof, will more than any other material activity of our people, favor, foster and further development in the length and breadth of the United States of America and will secure the benefits—social, moral, commercial, industrial, material, educational and personal—in the progress and uplift of the American people, which follow in the train of easy communication and transit between the great centres of population and distribution and the great productive areas of the nation, and will "bind the states together in a common brotherhood and thus perpetuate and preserve the Union—to this end is pledged the National Highways Association.

"See America" is almost a duty of all patriotic citizens. At least, see all one can is a duty. The motor car offers the most exhilarating, the most interesting, the most enjoyable, the most instructive means of "seeing." Having thus covered over 250,000 miles, I speak from experience.

To give an opportunity of seeing a goodly part of America, the National Highways Association, National Old Trails Road Association, the Automobile Club of Southern California, and the Lincoln Highway Association have indorsed a proposed trip over the National Old Trails road to the Pacific coast, returning via the Lincoln highway. The direct management and responsibility for this trip is in the hands of two of our

Some conception of the extent and value of the work carried on by the National Highways Association and of its unequalled equipment for the planning and management of such a tour as that which it will undertake can be had from a short review of its history and methods.

The association is the creation of Charles Henry Davis. He it was who conceived the idea of organized effort for good roads on a grand scale, perfected the organization and attracted to it the influential men who have done so much for its success.

All his life Mr. Davis has been interested in roads, as were his father and grandfather before. His grandfather, Edward Morris Davis of Philadelphia, engaged in the business of constructing roads, founding a firm that was continued and enlarged by his son, Corbit Davis. This business was inherited in turn by Charles Henry Davis, who continued it until he found an opportunity in the formation of the National Good Roads Association to accomplish more for the cause of good roads than he could even as the head of a great constructing company.

Renounced Business for Good Roads.

When the idea of a great national propaganda to secure federal aid in the building of roads occurred to him, Mr. Davis, who is a very wealthy



Government Irrigation Project in Arizona.

man, retired from the commercial construction of roads so that his motives might not be misunderstood and began to give most of his time

An enormous amount of information on every subject relating to roads is kept on file here. The work is done by an extremely efficient force of workers and has been of great value. A publicity campaign is conducted the year round to educate the people to the advantages to be derived from the movement.

WHAT THE TOURISTS WILL SEE.

The exceptional interest provided by a trip over the Old Trails Road is shown by the following list of places of historical significance and scenic grandure which they will visit:

Gottysburg Battlefield	Petrified Forest
Pennsylvania Mountains	Meteor Crater
Pittsburg Steel Works	Painted Desert
National Pike Monuments	Canyon Diablo
Indiana Automobile Factories	Canyon Padre
Eads Bridge across the Mississippi	San Francisco Peaks
Kansas Cornfields	Cave Dwellings
Wheeler's of Old Santa Fe Trail	Sunset Mountain
Trinidad Coal Mines	Coconino Forest
Fisher's Peak	Grand Canyon
Raton Pass	Extinct Volcanoes
Maxwell's Ranch	Colorado River
Mexican Adobe Villages	Mojave Indians
Starvation Peak	Mystic Mesa
Old Pecos Mission	Mojave Desert
Old Pidgeon Ranch	Cajon Pass
Apache Canyon	Orange Groves
St. Miguel Mission	Rubidoux Mountains
Oldest House in the U. S.	San Diego Mission
Cathedral at Santa Fe	San Diego Exposition
Old Exchange Hotel	Coronado Beach
Indian School	San Diego Harbor
La Bajada Hill	Pacific Ocean Road
Deep Gorge Cut	La Jolla Caves
Irrigated Rio Grande Valley	Mission San Juan Capistrano
Old Albuquerque	Wonderful Los Angeles
New Mexico State University	Mission San Gabriel
Isleta Pueblo	Mission Buena Ventura
Laguna Pueblo	Mission Santa Barbara
Black Mesa	Gaviota Pass
Mount Taylor	Mission Santa Ynez
Continental Divide	Mission San Luis Obispo
Lava Beds	Paso Robles Hot Springs
Beautiful Red Cliffs	Mission San Miguel
Fort Wingate	Mission Carlos
"Haystack" Monoliths	Monterey
"Megaphone Rock"	Mission San Juan
San Franciscan Monastery	Santa Clara Valley
Indian Trading Posts	San Francisco Bay
Navajo Indians	Golden Gate
	San Francisco Exposition

The present tour, which overshadows all similar work for the year, will aid enormously in securing public notice for the propaganda of the association, in addition to showing the participants most of the really interesting scenery of America.

The two organizations which are most active in co-operating with the National Highways Association in this tour are the National Old Trails Road Association and the Automobile club of southern California. Judge J. M. Lowe of Kansas City is head of the former and F. L. Baker is president of the latter.

Both of these organizations have been especially active in securing publicity for the tour, and in pointing out to motorists generally the great scenic and historical interest which it

contains for them. Both are especially interested in encouraging transcontinental traffic over this route because that will encourage further improvement of the Old Trails road and bring more motorists to southern California. These representatives will meet the tourists and will do everything possible to make the trip pleasant.

He at once secured the co-operation of Senator du Pont, who had already shown his interest in the subject of presenting the people of Delaware with a finely built road extending from one end of the state to the other.

The campaign of the association directed at the public, and at state, county and national officials, has aimed to reconcile the interests of all the political subdivisions in the construction of roads.

For the purpose of public education the association created a large and effective organization. Its headquarters for this purpose were established in a building donated for the purpose by President Davis, at South Yarmouth, Mass., on Cape Cod. In this was installed an office force to take care of large correspondence of the association, and a large drafting room was established, in which maps of all the highways in the United States were made and kept constantly up to date.



Motor Tourists in Colorado.

STREET RAILWAY BUYS 100 "JITNEYS".

A DEVELOPMENT in the "jitney" movement which is of the greatest significance for both the 'bus operators and the street railway interests is the fact that the Virginia Railway and Power Company of Richmond, Va., has ordered 100 five-passenger Briscoe cars, which it will operate as "jitneys" along the lines of its street railways in the Virginia capital.

This means that the street railway interests, who have a thorough knowledge of transportation problems and the best of reasons to make a close study of the "jitney" situation, have begun to believe that the movement is something more than a passing craze and that there is going to be a steady demand for this sort of transportation.

It means also that when the 'busses are defin-

crease in its earnings for the preceding nine months.

An interurban motor service with distinctly original features is projected between Pittsburg, Kansas and Fort Scott, 32 miles. A company has been formed which proposes to purchase a private right of way and lay on it concrete tracks each a foot wide, over which large 'busses, each carrying from 50 to 75 passengers, will operate. Fifty thousand dollars worth of capital stock is said to have been subscribed, although the company has not yet incorporated.

The promoters claim that such a line will cost about one-tenth as much as a trolley line and operating expenses will be very much less. Branch lines are planned to various towns along the route and if the venture is successful such a system may be extended throughout Kansas. It is regarded as having large possibilities wherever transportation is needed, but population is too sparse to support a trolley system.

A company operating a "jitney" line in St. Louis declares that it cannot make both ends meet on a basis of five-cent fares for four miles and has announced that its rates will be raised to 10 cents. It figures the cost of operating a "jitney" at 7¼ cents a mile. That would make it necessary

to haul six passengers on every trip to pay expenses. Since the "jitneys" started to operate in St. Louis the United Railways Company has been carrying an average of 47,743 people less every day.

The owner of a large number of cars operated in "jitney" service in Galveston has agreed to use them Sunday mornings to carry aged and very young members of the congregation of his church, the Central Christian, to services every Sunday morning. Tickets will be issued by the pastor to members who, for various reasons, are not able to walk to church. They will be picked up at certain stations and taken to the services. This is part of a campaign to increase the church attendance.

Legal restrictions on "jitneys" of all degrees of severity have been passed or are still under consideration in all parts of the country.



First Shipment of Briscoe Cars to Virginia Street Railway, Which Has Ordered 100 in All.

itely established the individual owners, who are having it all their own way just at present, are likely to encounter competition from well organized and highly capitalized concerns which, in many cases, will be the street railways companies.

C. B. Buchanan, general manager of the Richmond company, rushed his order to the Briscoe factory early in the month and deliveries were begun at once. Eighteen cars were shipped on April 12 and the others are following as fast as the makers can get them out. The cars are guaranteed to yield 25 miles per gallon of gasoline. The company is building garages to house the cars, and additional orders will probably be placed soon. The company decided to go into the "jitney" business after one month of competition with the 'busses had cost it \$15,908 in gross receipts and wiped out the entire yearly in-

WIRELESS TELEGRAPH ON TRUCK.

The wreck of the steamship Republic demonstrated the worth of the wireless telegraph in civil life; the European war is demonstrating its value in military service.

The armies of the world are watching the different uses now being made of it, and are developing the service along lines suitable to themselves.

One of these is the United States army. The Signal Corps branch has always kept pace with modern de-

velopments in the field of communication, vocal, visual and invisible. While it long has been using the wireless telegraph as an important factor in its work, it is only recently that it has experimented with and adopted a wireless telegraph receiving and sending station mounted on a motor truck.

Experiments were conducted several months ago with a truck equipped as a station, and the results were so satisfactory that two machines have already been "recruited," and there are prospects of several more being added within a short time. They probably will be stationed in various parts of the country.

The second machine, officially designated as "Radio Tractor No. 2," has recently been tested at Fort Myer, the accompanying illustrations showing its equipment and it being assembled for operation. The chassis is a Jeffery "Quad," which is driven and steered by all four wheels, on which the

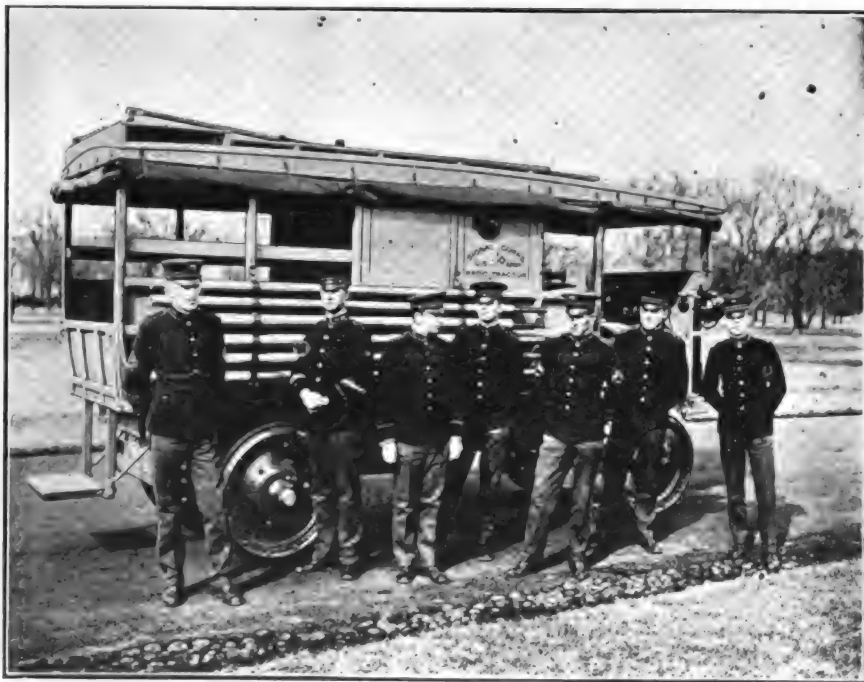
brakes operate. Because it has traction with every wheel, the machine is peculiarly adapted to military work, it being possible to drive it up and down steep ascents that would be impossible for other types of vehicles, and it can push and pull through sand, mud and snow, or traverse rough ground.

The chassis is equipped with a special body built to government specifications. It has a permanent top supported by stanchions, and the middle section is protected by sides. Curtains are provided for enclosing the rest of the body, which is normally open. At the rear of the roof is a platform on which can be erected a tripod, which serves as a derrick to raise the wireless station mast. When erected the mast is 80 feet in height. Wire guy ropes hold the mast when raised. It is composed of eight sections of tubes, which are carried on the sides of the body in slings when dismantled.

While the ordinary sending range of the station is 250 miles, its receiving range is practically unlimited. The electric current for sending is supplied by an electric generator of two kilowatts rating, which is driven by the motor of the chassis, the shifting of a lever being sufficient to couple the generator when it is to be used. The unit is designed for hard usage in all kinds of military operations, and in the tests to which it has been put it has met all the expectations.



The Jeffery "Quad" Wireless Station
"Going into Action."



Portable Wireless Telegraph Station Mounted on Jeffery "Quad" Chassis.

THE MOTOR CAR ABROAD.

ANOTHER of the interesting cars which the war has developed in such profusion is a fully equipped bacteriological laboratory mounted on



British Army Bacteriological Laboratory.

a motor chassis. This has been designed to form a part of the medical equipment of the Welsh Army Corps, which is now in training at Colwyn bay.

It carries a box body with side windows and ventilators in the roof. It is well lighted on the interior for night work and the forward compartment of the body is completely equipped as a laboratory. There is a sink, racks for culture tubes and chemical bottles, distilling equipment and all the accessories.

The rear compartment is fitted with beds for the physician and his assistant. The driver's seat is so arranged that it may be protected by curtains and it opens into a comfortable bed. At the top of the driver's cab is a folding berth designed to accommodate the orderly.

Provision is made for a large hot water supply.

The car will be used for testing food and water, and making analyses of substances for the purpose of detecting disease. Cultures will be prepared also with which patients will be inoculated. The car brings to the movable field hospital a completeness that it has never before had.

OLD ENGLISH RESTRICTIONS.

After noting the legislative restrictions under which the first motor propelled vehicles in England were operated no American motorist, however unreasonable the law makers of his state

may seem to be, will feel that he has no just cause to complain.

Steam stage coaches were introduced into England in 1824, but they so shocked English conservatism that, even had the mechanical problems been fully solved, they would never have got along. The state of sentiment may be judged by the locomotives on the highways act, which was passed in 1865. This provided that no self-propelled vehicle should go through the streets or roads faster than four miles an hour and that a man must go in front of it carrying a red flag.

GERMAN AUTOMOBILE LAUNDRY.

The thoroughness of the German military organization, and the utility of the motor driven vehicle, is exemplified by the laundry train built for the army by the Daimler Marienfelde Company. It consists of a powerful tractor and three trailers. A steam driven mangle is carried in the tractor, which also serves as the collector of clothes from the hospitals to which it is attached. The first trailer contains a huge copper boiler, the drying press and a disinfecting vessel. The second trailer carries washing machines and pumps for cold and hot water, while the third is a storage car in which are transported soap, soda, coal, petrol, tools and other equipment. In actual service the train is drawn up into horseshoe form, to make all parts of the unit convenient to the staff, which consists of 12 men and a sub-officer. Blood stained clothing and other particularly soiled articles are first treated in the



Interior of British Laboratory.

disinfecting vessel. Woolen garments that cannot be handled in the mangle are placed in a special drying press. The carrying capacity of the motor washing establishment is approximately 2500 pounds.

COKE AS THE FUTURE FUEL.

Professor Vivian Lewes, speaking before the Royal Society of Arts in London, stated that the perfection of the successful coke burning boiler would soon develop the steam truck to the point where it will be a serious competitor for gasoline driven vehicles.

He described a test by the Royal Automobile club, in which a coke burning steamer won for its designers the award for the greatest engineering achievement of the year in automobile engineering.

The fuel used by this machine was broken coke passing through a two-inch mesh. Fuel consumption during two days' steady running over ordinary roads worked out at .59 of pound per ton-mile. With coke at 18 shillings per ton this worked out at one penny, or two cents per ton-mile. At the current price of gasoline in London, 10 pennies, or 20 cents, the ton-mile cost averages twice as much.

Naturally the perfection of a successful design that would cut fuel costs in two would have to be seriously regarded by makers of gasoline vehicles.

MOTOR X-RAY EQUIPMENT.

Using money supplied by a wealthy Hamburg merchant, Professor Generalsuperphysician Brauer of the German army, has designed a portable X-Ray plant, carried on two motor chassis, which supplies the army field hospital with a thoroughly dependable X-Ray equipment.

This outfit is in use on the eastern front. The German military hospitals in other places have X-Ray equipment, but they have the serious shortcoming, from a military point of view, of being dependent on a permanent electrical supply which may be put out of commission at any time by the artillery shooting down the wires.

The two cars in the portable plant both run under their own power, and are marked promi-

nently with Red Crosses. One car carries an electric power station, the dynamo of which is driven by a gasoline engine. This equipment can be removed when the car reaches the field hospital, and as the car is also fitted with stretchers, it may then be used as an ambulance.

The second car contains the high tension transformers and other necessary apparatus. There is also a receiver table, which is a long, upholstered stretch, on which the wounded man is placed. The light is mounted above and the photographic plate below the receiver table.

GERMANS LIKE AMERICAN CARS.

The weekly bulletin of the general conditions in Germany during the European war, published in Berlin, Germany, contains the following statements: "American cars of popular price enjoy a good reputation in Germany, and their use is

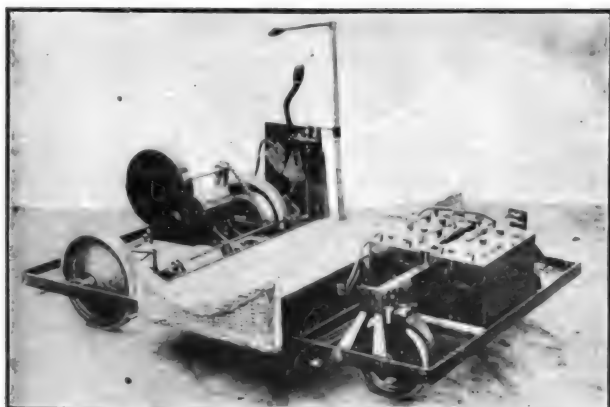


British Motor Vehicle Driven by a Coke Burning Engine.

steadily increasing. The future belongs to the popular priced cars of about \$750, two or five passengers, equipped with accessories and appliances which tend to make auto riding a pastime and healthy exercise. Contrary to American practise, but few owners drive their own cars, because cranking, change of tires, pumping, etc., constitute the less desirable features of automobiling. Automatic appliances have not so far been introduced to any extent in Germany. As a matter of fact few ladies can be found who drive their own automobiles, the reason being that automobile operation still lacks the advantages of the average American car. German license regulations for car builders are rather strict, as for instance rack and pinion for the steering gear is not permitted, only worm drive. Cars must be equipped with both foot and hand brake, the foot brake acting upon the driving shaft, and the hand brake upon the rear axle."

ELECTRIC WHEEL CHAIRS WIN FAVOR.

THE wheel chair which has long been the most vividly remembered feature of a visit to Atlantic City or Palm Beach, is appearing this



Chassis of Electrically Propelled Wheel Chair.

year in a new guise. It has been equipped with electric storage batteries and a motor, and on its pneumatic tires it travels with rather more silence and comfort than is claimed for an electric coupe.

In this form it has sprung into enormous popularity at Palm Beach and at the California expositions, where hundreds are in use. Its freedom of movement and ease of management, and the fact that it does not have to be pushed about by a porter, like the old type, has had much to do with its vogue. The absence of the porter provides a degree of privacy and permits a freedom of conversation that was never before possible. Furthermore, the passengers find much pleasure in a vehicle that they can guide themselves.

Current is supplied by a light and compact storage battery stowed away under the wicker dash. The machines rented to the public have an average speed of four miles an hour. They can be supplied also, if desired, with gearing that will yield speeds of from one to 10 miles an hour for street use. The battery capacity is sufficient to run them for eight hours on good surfaces.

There are several models of the chair already available. They have motors of about $\frac{3}{8}$ -horsepower and frames of tubing similar to that used in bicycles. They are equipped with bicycle wheels and pneumatic tires.

Motors, gears and all mechanism is hidden by the trim lines of the rattan wicker body. One model is provided with an attractive sunshade.

which transforms it into a small phaeton. All of the types that have so far appeared are built to carry two passengers.

The most necessary feature of such a vehicle is simplicity of operation and control. This has been so completely attained that any one without previous experience can drive in perfect safety. Power is controlled by two convenient foot pedals. One of these releases the brake and at the same time turns on the electric current. The other sets the brake and turns off the power. Steering is accomplished by a long handle, similar to that used in many electric vehicles. The slow speed and effective brakes make accidents practically impossible.

Some of the chairs, however, are fitted with a guard rail in front like an automobile bumper. When this rail comes in contact with an obstruction the current is automatically cut off, and the brakes are automatically set. Brakes always remain set when the car is standing idle and can be released only by pressure on the "go ahead" pedal.

The chairs cannot run away on an incline because speed is determined by that of the motor to which it is positively geared, and on a down grade the motor pulls back.



Simple and Safe Control Permits a Novice to Drive.

In fact the whole construction of the vehicle is so simple that it is almost automatic, possessing in the highest degree the quality which builders of machinery have called "fool proof."

SAFETY RULES FOR PITTSBURG.

The high rate of traffic fatalities in Pittsburg Penn., is partly responsible for the drastic regulations, effective May 1, promulgated by the public safety director, Charles S. Hubbard. Drivers of vehicles are warned not to drive at a rate faster than a mile in 2½ minutes. Twenty men have been added to the police motorcycle squad to enforce the regulation. The ordinance further states that "for hire cabs and taxicabs will not under any circumstances be permitted to stand in front of cafes or theatres or adjacent thereto." The "bright light ordinance" which was passed a year ago, but since largely disregarded, is to be enforced rigidly. This means that the blinding acetylene and electric lamps that bewilder pedestrians and vehicle drivers by their rays must be dimmed. A regulation that is expected to greatly lessen the number of collisions is the prohibition of the turning of cars between square crossings. All cars must stop close to the curb and be headed in the direction of traffic flow. Violators will be haled to court and the second summons will mean a jail sentence. In addition to these regulations the director has indicated several streets in the downtown district in which vehicles can pass only in one designated direction.

TOURING FROM BOSTON TO PACIFIC.

Thirty seven-passenger Studebaker touring cars were recently purchased by the H. W. Dunning & Co., Boston, Mass., to inaugurate trans-continental tours to the California expositions. These leave Boston, May 31, June 28 and July 26, and will generally traverse the Lincoln Highway, with a few digressions. From the Mississippi the tours will follow the river to River road to the Missouri. Another detour from the Lincoln Highway is planned for Colorado to permit the passengers to view the mountain scenery of that state. The southern route has been selected around Great Salt Lake.

ANTI-SKID TIRES ARE POPULAR.

During the past two years the demand for anti-skid auto tires has greatly increased, is the statement made by the Federal Rubber Manufacturing Company, Milwaukee, Wis. H. A. Githens, vice president and sales manager of the company, states: "Right now the percentage of our rugged tread tires shipped from the factory,

as compared with the smooth tread, is three times as great as it was a year ago. The increase in sales of these tires is, of course, partly due to the fact that there has been considerable reduction in the difference in cost between the smooth and rugged tread tires, but, in my opinion, it has been principally a matter of education." Mr. Githens points out that non-skid tires are less liable to puncture, the raised studs and the spaces between them affording great protection against stones, glass, nails, etc. Many motorists are using non-skid tires on all four wheels, finding that they hold the road better, make steering more accurate and last longer.

STUDYING CONVICT LABOR.

For the purpose of obtaining accurate and complete information on the subject of employing convicts in highway construction work, the National Committee on Prisons and Prison Labor and the Graduate Highway Department of Columbia university are jointly investigating highway construction by state prisoners in the southern states. Convict road work was similarly treated last year and the combined information will serve as a basis of information of all those attempting to direct convict labor work, no matter in what section of the country.

MOTOR SERVICE OVER THE ANDES.

Motor cars carry mail and passengers from Neuquen, Argentine Republic, to Bariloche, Chile, through a pass in the Andes mountains, making three trips a month. Each passenger is charged about \$100 a trip, while excess baggage, above a limit of 30 kilos, is charged for at the rate of one per cent. of the fare per kilo.

Three Overland light delivery cars, built by the Willys-Overland Company, Toledo, O., have been bought by the officials of the Panama-Pacific Exposition for use in the electrical department.

Massachusetts automobile registrations for the first quarter of 1915 totalled 56,931, as against 41,750 for the same period of last year.

Automobile registration in New Hampshire is now vested in the newly created office of Commissioner of Motor Vehicles.

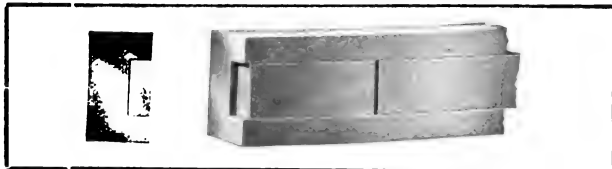
A bill before the Wisconsin legislature renders an automobile attachable for a garage bill.

CAR ACCESSORIES AND EQUIPMENT.

MICRO PISTON RINGS.

Micro Piston Ring Company Making Rings That Prevent Leakage of Compression in Gas Motors.

The compression of a gas motor is dependent upon the fitting of the piston rings. Through poor fitting or poor material the slots of the rings will gradually open and



How Micro Rings Operate.

allow the compression to leak into the crankcase. Not infrequently the rings will turn in the piston channels until the slots register, at which point the gas will have easy course of escape into the crankcase. The piston rings should adequately perform their function in compressing and confining the gas in the combustion chamber. As piston rings are very inaccessible and, if impaired in any way require a great deal of time and expense to replace them, great care should be taken to see that the rings are made of the best of material and also fit the channels correctly. The Micro Piston Ring Company, No. 1960 Broadway, New York City, is manufacturing piston rings which they state will eliminate all the troubles which are common to most makes of rings. The Micro ring consists of two assembled members, a main ring which neatly fits the piston channel, and a secondary or auxiliary ring which fits into a recess that is cut in the main member. The outer surface thus forms part of the bearing on the cylinder walls and by placing the slots of these rings diametrically opposite, the rings become sealed and then it is impossible for the gas to escape. The accompanying illustration clearly shows how the joints are sealed. Micro rings are made from

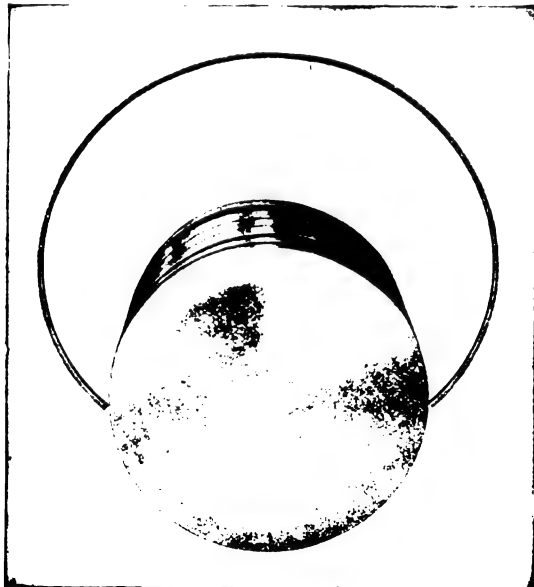


Illustration of Flexibility of Micro Piston Ring.

the best gray iron procurable. This material is carefully tested by the company's experts so as to contain a fine uniform grain throughout. Care is also taken to have this metal a few points softer in carbon than would be detrimental to the ordinary cylinder surface. It will

be noted by the illustration that the uniform grain affords the ring a great amount of flexibility, which can easily be drawn over the surface of the piston without breaking. These rings are made in several sizes to fit any motor. Micro rings are also desirable for aeroplane, marine, steam and oil engines, or wherever compactness is required between the piston and the cylinder walls. The Micro Piston Ring Company also makes rings of odd sizes to specification. It has several attractive propositions for manufacturers, jobbers, supply houses and repairmen, who may obtain such on application to the company and by mentioning the Automobile Journal.

U. S. PORTABLE AIR COMPRESSOR.

Practical Outfit, Operated by Electric Power, Adapted for Service in Garages and Repair Shops.

The United States Electrical Tool Company, Cincinnati, O., is manufacturing an electrically driven air pump which should be equally as useful in private garages as in public service stations. The pump is mounted on a platform which is fitted with three wheels and is movable to any part of the garage where it may be needed. Many garages are equipped with stationary air pumps, with which the car must be brought to the air connection. This may necessitate partial inflating of a tire by a hand pump or running the car on the flat tire, which is bad practise, as the pressure of the tire may cut holes in the tire tube.



The United States Electrical Tool Company has placed an electric motor driven one-cylinder air pump on a platform, which compresses the air into a tank, located at its side. The air is then forced into the tire by pressure from the tank. The pump cylinder is cooled by air and receives lubricant for the piston from a grease cup fitted on the top. The tank is six inches diameter and 12 inches length. It is fitted with a petcock at the bottom, so that the condensation may be blown out. All danger of oil being carried into the tire is eliminated when the air is first pumped into the tank.

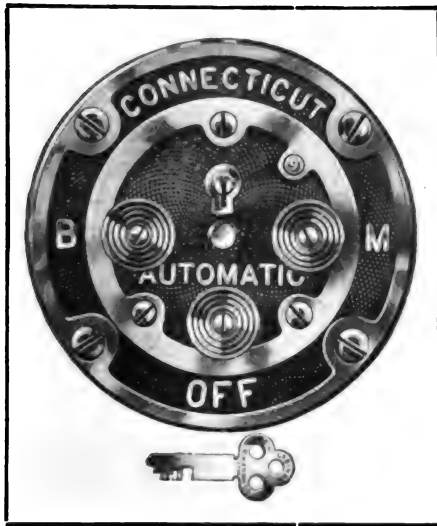
The motor is rated at a half horsepower and is made for use with direct current of 110 or 220 volts, or alternating current, 110 or 220 volts, 60-cycle, single-phase. With this motor outfit one can inflate a 35 by four-inch tire from flat to 70 pounds pressure in 1½ minutes. The cable to the motor is fitted with a connection that can be attached to a lamp socket. The air tank is fitted with a gauge so that the number of pounds pressure carried in the tank may be learned at a glance. Eight feet of half-inch rubber hose is attached to the tank and is used to connect it with the tire. A gauge is attached to this hose, which shows the pressure of air in the tire. A long handle is attached to the front castor, by which the outfit may be moved when desired.

CAR ACCESSORIES AND EQUIPMENT.

LOCK ATTACHMENT FOR CONNECTICUT SWITCH.

Automatic Ignition Coil Locking Device That Positively Locks and Prevents the Car from Being Stolen.

The Connecticut Telephone and Electric Company, Inc., Meriden, Conn., is manufacturing a locking device that will meet the demands of the car owners who are



Ignition Coil Lock.

employing the Connecticut automatic ignition coil. Automobiles are constantly being stolen, or driven off without the owners' consent, and as a result many locking devices have been created and tested with more or less success. This company guarantees absolute safety to the car that is equipped with its locking device attached to the above mentioned coils, as no two locks can be released with the same

key. This lock differs from the ordinary coil lock inasmuch as the key is employed only to release the lock and is not needed to complete the circuit. With this arrangement the key can be conveniently carried on the key ring at all times. The lock is fitted to the inside of the switch plate by a unique arrangement, and the switch can be locked by pressing a small button which is located over the magneto button on the outside of the plate. This makes it necessary to use the key only when the switch is to be unlocked. This device is so designed that it cannot be locked until the switch buttons have all been released, thereby making it "fool" proof. The manner of installation is very simple, as all that is necessary is to remove the three screws which hold the switch plate to the switch and then withdraw the plate. The new plate can be inserted and fastened in place by the same screws. Care should be taken, however, to note that the switch buttons are in the "off" position during both operations and that the interior mechanism is not tampered with. This device is sold for \$2.50, with the understanding that the old plate must be returned to the factory as soon as the new one is installed. Duplicate keys will be furnished for the additional charge of 15 cents each.

H-W ALL-WEATHER TOP.

Equipment with Which an Open Car Can Be Quickly Converted to Afford Limousine Comfort.

The Hammond-Williams Convertible Top Company, Inc., 529 Marbridge building, Broadway and 34th street, New York City, is manufacturing a type of automobile top which will afford the fullest pleasure for the motorist in sunshine or rainy or cold weather. This is known as the H-W All-Weather Convertible Top. It attaches to the body in the same manner as any ordinary one-man top and can be folded when an open car is desired.

The car is easily converted to have the protection of a limousine by inserting handsome French plate glass windows into the brass channels of the top. The win-

dows are held firmly at the bottom by aluminum brackets. When all the windows are placed in position the car is absolutely weather proof. These windows can be installed in about three minutes without the use of tools and without aid. This equipment for converting a car



Touring Car Equipped with an H-W All-Weather Top.

makes motoring a pleasure, especially in the evening, when a limousine is very desirable. No awkward movements are necessary on entering or leaving, as the windows swing with the door. When the windows are not in use they are carried in a neat, narrow box, placed behind the front seat. The price of this top ranges from \$150 to \$300, depending on the size and make of the car.

YANKEE FOLDING TIRE PUMP.

A Convenient and Strong Pneumatic Tire Pump Which Can Be Folded Into Compact Unit.

The Eugene Atkins Company, Inc., Elkhart, Ind., manufactures a hand pump, named the Yankee folding pump, which is claimed to make the inflation of pneumatic tires a

simple and easy operation. The principal feature of this pump is that it can be clamped on the running board of a car, and as the piston works horizontally, it can be operated while in that position, as is shown in the accompanying illustration, it not being necessary for the operator to stoop. This is claimed to be a great advantage over most hand pumps, which usually require the use of both hands and feet and also much energy. The outfit comes complete with eight feet of air hose, with necessary connections, for \$6 f. o. b. the factory. An additional charge of \$1 is made if a pressure gauge is desired. Inquirers who write and mention the Automobile Journal will be furnished with complete data, etc.



The Yankee Folding Pump.

JENSEN TIRE PUMP.

Illinois Concern Manufactures a Folding Tire Pump More Effective Than Power Driven Pumps.

The W. H. Howell Company, Geneva, Ill., is manufacturing and securing distribution in all parts of the country for the Jensen Tire Pump, a hand pump which is said to be much more easily operated than the ordinary

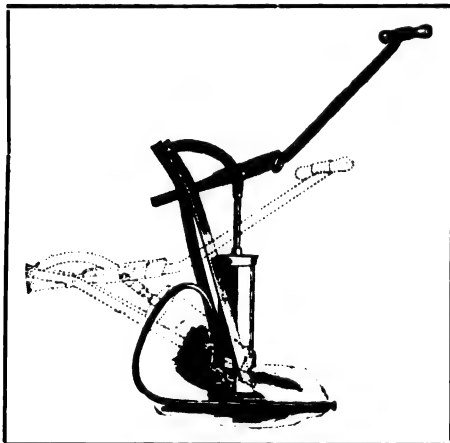


Howell Emergency Brake Shoe.

vertical type and so effective that many points of superiority over the engine driven or spark plug types are claimed. 'It is a folding device built on the fulcrum principle, so that the whole movement of the body may be used in pumping. While the motion is similar to that by which an ordinary type of hand water pump is used, the design gives decided advantages over usual lever pump. The air is handled only once, on the down stroke. This makes the pump operate very much more easily than the ordinary pump and usually arouses great enthusiasm on the first trial of the device. Instead of having the lever pivoted in two places on bolts or pins, the lower end of the Jensen lever slides in a bridle. At the beginning of the stroke the fulcrum is about 6½ inches, and as the plunger proceeds downward the end of the lever slides through the bridle until at the finish of the stroke the fulcrum is only about three inches, thereby doubling the leverage. In this manner twice the power is produced that can be secured with the ordinary lever pump.

The cylinder is made of seamless brass tubing, and the side parts are of steel, producing both lightness and strength. The plunger rod is cold rolled steel, and the cup leather is of the best leather obtainable and will last indefinitely, at least three times as long as the cup leathers of the compound pump. It is manufactured throughout for durability.

With the Jensen pump it is said to be as easy to pump against 90 pounds pressure as it is to pump against 65 with the ordinary hand pump. The air capacity is larger, so that a tire may be inflated in about one-fourth of the time. A boy or woman can operate it. When folded the pump will fit any tool box. It is very simple and



Jensen Tire Pump.

very seldom gets out of order, being superior in that respect to the mechanical pumps. Its makers declare. Garage men all over the country have recognized the great possibilities of this specialty and have taken up its distribution. The price is \$5.

A no other fast selling product of the Howell company is an emergency brake shoe for Ford cars, which is fitted with a regular brake lining. This is a great improvement over the unlined shoes that have usually been

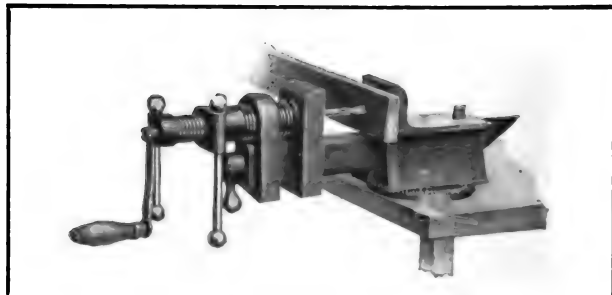
used on Ford cars. It is much more durable and produces a more efficient and reliable brake. The price is \$1.75 the pair.

NEWHALL COMPANY'S TRIDENT.

New York City Company Making a Combination Drill Press, Anvil and Vise of Unique Facility.

The Newhall Chain Forge and Iron Company, No. 90 West street, New York City, manufactures a device which involves all the features of a drill press, blacksmith anvil and a vise. This combination is made as a unit and is offered to the trade under the name of Trident. The drill may be operated independently of the vise and is fitted with a shaft that turns only the drill. The shaft revolves inside of a large worm, which when the latter is turned, will feed the drill to the work. A still larger worm is fitted over the feed screw and controls the operation of the vise. The entire drill press can be removed by unscrewing the feed screw from the larger worm. The drill chuck will receive all sizes of straight or taper shank drills, and also can be used for tapping purposes, a squarehole being bored through the vise jaw.

The vise, which is extra heavy in construction, is equipped with two wrought steel jaws, which are 3¼ inches in width and have an opening radius of eight inches. Perhaps the most prominent feature of this vise is the locking handle for the quick adjusting of the vise or drill press. The jaws of the vise may be set to any desired position by simply raising the lever to a hori-



Combination Drill Press, Anvil and Vise.

zontal position and then sliding the jaws to about 1½ inches of the exact position desired, where the object may be made tight with the turning of the screw. Inquirers may secure information by addressing the maker and mentioning the Automobile Journal.

PARTS FOR "ORPHAN CARS."

Rare Bargains in Repair and Service Parts of Old and New Cars.

A great problem that has faced the owners of "orphan cars," cars the manufacturers of which have gone out of business, is to obtain repair and service parts. The Puritan Machine Company, Detroit, Mich., has solved the problem in large measure. It has been the practise of this company to purchase the stocks, patterns, etc., of defunct manufacturers, and it now announces that it has on hand more than 1,300,000 different parts and accessories for motor cars and trucks. The recent purchase of the Speedwell Motor Car Company's stock, drawings, etc., marked the 61st company whose assets the Puritan company has bought. The company has not confined itself to the one field, however, it also buying up the surplus stocks of going manufacturers. Among the cars "orphan" and otherwise, for which parts can be obtained are the Speedwell, Warren, Everett, Marquette, Ranier, De Luxe, Michigan, F. A. L., Reliable, Dayton, Welch, Wayne, Northern, Marion, Carter H. Henderson, Auhut, Elmore, Barnes, Cutting, Grabowsky, Abbott-Detroit, Demot and others. The company publishes a complete list of makes of cars and accessories and parts in a bulletin which it distributes free to those who write to the company's office, No. 41 10th street, Detroit, Mich.

GENERAL NEWS OF THE INDUSTRY.

Ford Company Breaks Production Record—Willys-Overland To Increase Output— Dividends For Lozier Creditors.

IT IS a commonplace for the Ford Motor Company to break production records, so the fact that on March 17 it produced 2096 cars, a number equalling the annual production of many makers, is not as startling as it might otherwise be. This total represents cars built at the main plant in Detroit, Mich., and at its assembling plants in various parts of the country. Between 1300 and 1400 of the cars were completed in Detroit. This production record was made possible by a gradual increase in the number of men employed in the various plants and a gradual increase in their efficiency. The value of day's out-

shipped 3000 cars in March and is operating at a rate of 150 cars a day during April. This plant has recently increased wages, establishing a minimum rate of 50 cents an hour for all who have been there more than six months. An eight-hour day was also established. This means an increase of from 15 to 60 per cent. in the wages of employees.

PAIGE HEAD IN THE WEST.

Harry M. Jewett, president of the Paige-Detroit Motor Car Company, Detroit, Mich., has



put was about \$1,000,000.

There were between 16,000 and 17,000 men employed on that day in the Detroit plant, and most of the departments were operating 24 hours a day, in three shifts. The next day production

reached 2026 cars, and on April 11 it reached 2011. It will be steadily increased from now on and within the next few weeks an output of 3000 cars a day is predicted.

It has been only two years since the Ford company established a world record by building 1000 cars in a day. On June 17, 1909, the company's production first reached 100 cars.

Production for this year is expected to reach at least 325,000 cars, which will assure the repayment of \$15,000,000 or more to purchasers in rebates which were promised if production came to the 300,000 point.

The Canadian plant in Walkerville, Ont.,

At the Top Is a General View of the Ford Plant and Below May Be Seen a Part of the Ford Army of Employees.

made a five weeks' tour of the northwest and Pacific coast districts, visiting the Paige dealers and agencies in those sections. He is said to have secured an order in Los Angeles, Cal., for 102 Paige cars for immediate delivery. A feature of the trip was that Mr. Jewett addressed special meetings of the Paige dealers and salesmen in each city, thus meeting personally nearly every dealer and salesman and a great number of Paige owners and formed acquaintances that will be valuable in future dealings in the West. He visited the Panama-Pacific Exposition, where he found great interest being shown in the Paige exhibit, especially in the Paige "Six."

LOZIER TAKES SERVICE STATIONS.

The service stations at New York City and Philadelphia, formerly conducted by Harry Houpt, Inc., have been taken over by arrangements made by Theodore Friedeberg, president of the Lozier Motor Company, Detroit, together with Charles Shongood, vice president, and Harry Frank, treasurer. A full complement of workmen has been installed at each station, together with a sales force that will handle Lozier cars in each city. The San Francisco service station has been placed in charge of G. A. and J. L. McPherson of Detroit. Orders for 150 cars were placed recently for New York City and Philadelphia.

CADILLAC INJUNCTION IS MODIFIED.

The injunction granted to the Austin Automobile Company, Grand Rapids, Mich., preventing the continued use of the two-speed rear axle by the Cadillac Motor Car Company has been modified by the United States court of appeals in Cincinnati so that these axles may be repaired, used and resold. The original question regarding the use of the axle in new cars is to be appealed. The two-speed feature is not a part of the Cadillac design for 1915.

HUPP HANDLES BOSTON SALES.

The Hupp Motor Car Company, Detroit, Mich., is establishing a wholesale warehouse of its own in Boston for the direct wholesale distribution of Hupmobile cars in that vicinity. The retail sales for the district will be handled by the Wentworth-Fosdick Company, which handled both retail and wholesale heretofore.

JEFFERY MAKES BIG FOREIGN SALES.

Charles T. Jeffery, president of the Thomas B. Jeffery Company, Kenosha, Wis., has returned from Europe, where he spent several months. He is said to have closed orders for 2000 trucks, and completed arrangements for Jeffery distribution on a greater scale than the company has ever attempted before.

WALPOLE SALE CONFIRMED.

The court has approved the sale of the business and assets of the Walpole Tire Company, Walpole, Mass., to the creditors' committee for the sum of \$780,000. The stockholders' committee is said to have tried to block the creditors'

committee's bid by raising its own bid from \$775,000 to \$800,000, and declaring that the latter sum would be sufficient to satisfy all the creditors and would open a satisfactory way to the reorganization of the company. However, Judge Dodge, in the federal court, approved the sale to the creditors' committee.

KISSELKARS BREAK RECORD.

The Kissel Motor Car Company, Hartford, Wis., is declared to have produced a larger number of KisselKars during the past month of March than in any other month in the company's history, while the plan for April production calls for a total in excess of the preceding month. The All-Year Car, a Kissel idea that apparently is meeting with great popularity, is said to be responsible for the increase.

OVERLAND TO DOUBLE PRODUCTION.

Additions to the Overland plant now under way in Toledo will make it possible for the company on June 1 to begin producing 600 cars a day, according to President John N. Willys. At present the plant is building 300 cars a day. This represents an increase of 30 per cent. over last year and for 1916 the company is planning on a 100 per cent. increase in demand.

CREDITORS GET DIVIDENDS.

Dividend checks for the creditors of the Lozier Motor Company and the American Voiturette Company have been sent out by the Detroit Trust Company, receiver for both concerns. The Lozier creditors, whose claims have been approved, receive five per cent. The total amount is \$50,000. Creditors of the Voiturette receive 10 per cent. of their claims. This is the second payment to be made. There will be one more, it is stated.

CHALMERS LOSES CHIEF ENGINEER.

George W. Dunham, for several years vice president and chief engineer of the Chalmers Motor Car Company, has severed his connection with the company and in the future will devote all his time to his business as consulting engineer. He will continue as vice president of the company. C. C. Hinkley, who has been with the Chalmers company for several years, has been appointed chief engineer.

MARCH WAS HUPP'S BIGGEST MONTH.

The Hupp Motor Car Company, Detroit, Mich., maker of the Hupmobile, issued a statement to its dealers stating that the month of March was the biggest month in the company's history. Shipments showed a 22 per cent. increase over the corresponding month in 1914, and in addition to the vehicles sent out there were more immediate delivery orders on hand than ever before. The company began April with an average daily output of 80 cars, which while it will bring the total of the month up to more than 2000 cars, will not be enough to supply the demand.

J. Walter Drake, president of the company, stated: "There is little likelihood that we are going to be able to fill the demand for the 1915 Hupmobile to the end of the season. The March demand has forced us to capacity production, and we are increasing our facilities as rapidly as is possible in an effort to effect an increase of at least 33 1/3 per cent. in our normal capacity. If this demand continues throughout the spring months, in spite of all our efforts to secure additional raw material, there will be a shortage of Hupmobiles."

JEFFERY'S PROFIT-SHARING PRICE.

Because of its large volume of sales in all parts of the world and the consequent reduction of manufacturing cost, the Thomas B. Jeffery Company, Kenosha, Wis., announces that it has reduced the price of its four-cylinder model from \$1450 to \$1150. The company states: "The purpose of this announcement is to give to Jeffery dealers, purchasers and friends their share of the benefit of the prosperity that has come to the Jeffery company." The working force of the company has been increased by 500 men, and the plant is now working upon a 24-hour schedule, in three eight-hour shifts. Orders aggregating \$4,000,000 are said to have been received within a recent three weeks' period.

PAIGE-DETROIT'S GREAT RECORD.

The Paige-Detroit Motor Car Company, Detroit, Mich., recently declared its seven per cent. monthly dividend for March, and it aroused considerable comment over the remarkable showing of the company. It is stated that there are only 18 stockholders in the company, which is capitalized at \$250,000. There is no stock for sale, and it is held between \$275 and \$300 per share, which

is rated at \$100. These stockholders, receiving monthly dividends of seven per cent., net \$200,000 a year. In addition the company sets aside a surplus of \$500,000 annually.

BENSON TOURS THE WEST.

E. R. Benson, vice president in charge of sales of the Studebaker Corporation, Detroit, Mich., is travelling through the West. His itinerary includes Denver, Colorado Springs, Albuquerque, N. M., and a tour of the Pacific coast, with sojourns at both California expositions, and a trip to the northwest. He is expected to call upon the many western dealers who have sold more cars of Studebaker make than any other car listed at \$600 or over, it is claimed. California's registration for 1914 showed that 13,366 Studebaker cars were sold there last year.

RUBBER GOODS MAINTAINS PROFITS.

In spite of reduction in volume of sales, the Rubber Goods Manufacturing Company, of which the United States Rubber Company is a subsidiary, showed by its annual report only slightly decreased profits. This is due, it is stated, to the company's policy of increasing efficiency and reducing expenses. Net profits for 1914 were \$2,193,220, as against \$2,325,954 for 1913.

B. T. K. GEAR IN BANKRUPTCY.

Creditors of the B. T. K. Gear & Engine Company, Muncie, Ind., have petitioned the company into bankruptcy, declaring it to be insolvent and to have debts aggregating about \$50,000. Peter K. Morrison of Muncie has been appointed receiver by Judge A. B. Anderson of the Federal Court at Indianapolis, with a bond of \$5000.

PACKARD MODELS SELL RAPIDLY.

Since the announcement, Feb. 1, of the new line of Packard trucks, manufactured by the Packard Motor Car Company, Detroit, Mich., and consisting of units ranging in capacity from one to six tons, more than \$1,250,000 worth of orders have been received by the company. A remarkable feature is that a majority of the buyers had not seen anything but blue prints or advance catalogues, demonstrators having been placed in dealers' hands only recently.

AUTOCAR COMPANY CUTS PRICE.

The Autocar Company, Ardmore, Penn., has announced a reduction in the price of its truck chassis from \$1850 to \$1650. In a statement accompanying the announcement it is declared, "the volume of business done by the company during the last year has been so satisfactory and the demand upon the factory for a further increase of production by the branch managers has been such as to require a much larger output during the coming year. This increase in volume of business means a decrease in the expense of production and distribution, and therefore, in line with the policy of the Autocar company, we have seen fit to give the purchaser the benefit of this decreased cost in the decreased chassis price". It is stated that at present more than 2400 merchants, manufacturers and transportation companies, large and small, are using the Autocar delivery vehicle.

BELGIANS PLAN AUTO FACTORY IN U. S.

The International Peace Brotherhood, a Belgian concern, with offices at The Hague, is said to be planning to build an automobile factory at Dover, N. J. The new industry will employ about 200 people, and the plant, by the terms of agreement, must continue in operation for 20 years. In addition to producing automobiles, the new company will make marine motors, aluminum castings and pressed and spun wares.

SPEEDWELL SOLD TO PURITAN.

The Puritan Machine Company, Detroit, Mich., has purchased the Speedwell Motor Car Company, Dayton, O., and will continue the business at Detroit, to which city all the assets are being moved. The new owners are in a position to supply parts of all the Speedwell cars, having bought all original patterns, drawings and engineering data.

AUTO PLANTS TO BE INSPECTED.

A subcommittee of the Workmen's Compensation Bureau of New York, Albert Whitney, manager, will visit the larger automobile manufacturing plants in all parts of the country to investigate accident dangers and the methods of preventing industrial accidents. The motor car makers are not selected because it is considered that the work in the industry is extra hazardous, but because of the size of the industry and the

advanced methods generally in use among the manufacturers. The committee will meet in Detroit, Mich., in the near future and manufacturers from all parts of the country will be invited to attend. In advance of the meeting engineers will spend a week in the factories and will make recommendations upon safety to the committee and manufacturers.

OVERLAND'S EXTRA DIVIDEND.

In addition to declaring its regular dividend of 1½ per cent. on the common stock, the Willys-Overland Company, Toledo, O., has also declared an extra stock dividend of five per cent. Both are payable May 1 to stockholders of record April 22. The outstanding common stock will consequently be increased from \$20,000,000 to \$21,000,000.

REORGANIZATION OF S. V. G.

The S. V. G. Company, Reading, Penn., is said to have suspended operations. Plans are now under way to reorganize the company. Last fall a temporary receiver was applied for to pull the company out the financial straits it had fallen into. No report on the developments have been made public to date.

PENNSYLVANIA REDUCES PRICES.

The Pennsylvania Rubber Company, Jeanette, Penn., has announced that, effective April 15, there is a new schedule of prices for the following brands of inner tubes: Puregum red, Pennsylvania gray and nugray. The reductions are, 28 by 3, puregum red, from \$2.60 to \$2.35; 30 by 4, Pennsylvania gray, from \$4 to \$3.60, and 32 by 4½, nugray, from \$4.85 to \$4.35.

LAVIGNE ELECTS OFFICERS.

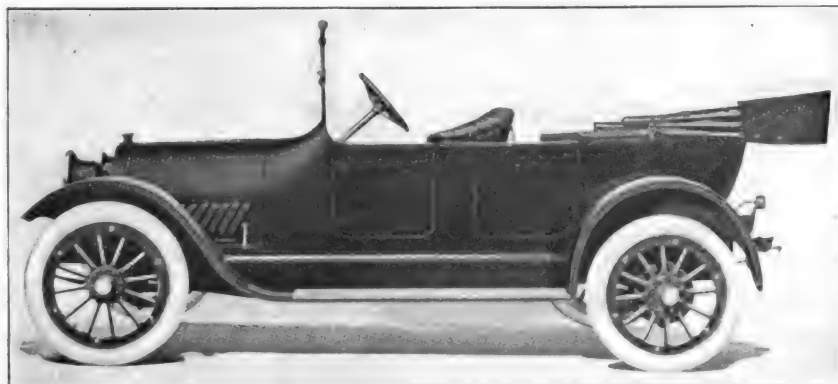
At the annual election of the Lavigne Manufacturing Company, Detroit, Mich., the following officers were elected for the next fiscal year: P. D. Dwight, president; N. A. Henwood, vice president and general manager; C. J. Brumme, secretary and treasurer.

The first meeting of creditors of the Motor-kart Company, Inc., which was adjudicated bankrupt, March 10, has been called by the referee in bankruptcy, MacGrane Coxe, for April 16, to be held at his office, No. 233 Broadway, New York City.

FOUR TYPES OF AUBURN 1915 CHASSIS.

THE 1915 Auburn automobiles built by the Auburn Automobile Company, Auburn, Ind., include four different chassis, two four-cylinder

are interchangeable and have cast iron heads electrically welded to nickel steel stems. The tappets are case hardened and are adjustable for wear. The valves are completely enclosed. The timing gears are helical cut to minimize noise. The connecting rods are steel drop forgings and the wristpins are chrome nickel steel that are clamped in the small ends of the connecting rods. The main, camshaft and connecting rod big end bearings are a high quality anti-friction metal. The motor is cooled by a circulation of water forced by a centrifugal pump through a cellulor radiator, radiation being pro-



Model 4-36 Chassis Equipped with a Five-Passenger Touring Body.

and two six-cylinder, which are designed as 4-36 and 4-43 and 6-40 and 6-47 respectively. The first numeral of each model is indicative of the number of cylinders of the motor, and the last two of the horsepower claimed for each. The models 4-36 and 6-40 are equipped with either touring or roadster bodies, and the models 4-43 and 6-47 with touring bodies only. In addition, a coupe body is installed on a 4-36 chassis when desired.

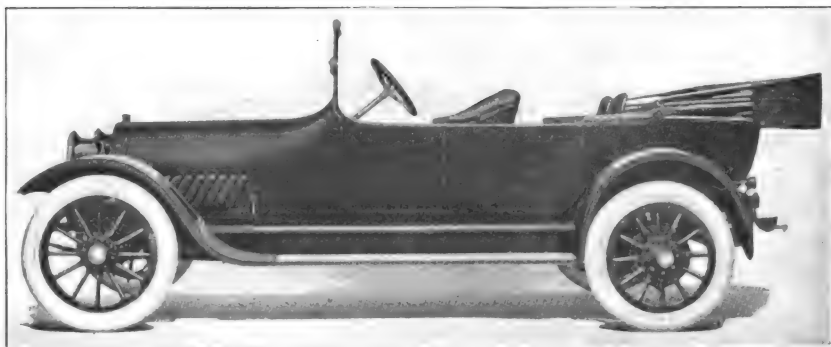
Model 4-36 has wheelbase of 114 inches and tread of 56 inches. The chassis has a unit power plant that includes a motor, clutch and transmission system gearset mounted on three points. The motor is a four-cylinder water-cooled four-cycle T-head type, with the cylinders cast en bloc, the cylinders having bore of $3\frac{3}{4}$ inches and stroke of five inches, having a horsepower rating of $22\frac{1}{2}$ by the S. A. E. formula. The cylinder block is cast with separate head. The intake manifold is cast integral with the cylinder block and this is carried through the block so that it is water jacketed. The cylinders, pistons and piston rings are carefully machined and finished.

The crankshaft and the camshaft each are mounted on three bearings of liberal size. The camshaft is a built-up type. The large valves

are moted by a belt-driven fan. Lubrication is by a splash constant lever system, oil being forced to pockets over each main bearing and to the timing gears, the overflow filling the oil pools into which the connecting rod big ends sweep, the excess oil flowing to the reservoir. A gauge indicates the volume of oil in the reservoir. The carburetor is an automatic float feed type.

Starting, Lighting and Ignition.

The electric current for lighting, starting and ignition is created by a generator and stored in a storage battery. The starting motor is installed so that its pinion meshes with a ring gear on the rim of the flywheel. The clutch is a leather-faced



Model 6-40 Chassis on Which a Six-Passenger Touring Body Is Installed.

cone and the transmission gearset is a selective sliding gear type with three forward speed ratios and reverse, with gears of chrome vanadium

steel and with the shafts mounted on annular ball bearings.

The drive is by shaft with two universal joints to a three-quarters floating rear axle. The front axle is an I section. The frame is of pressed steel channel section, cambered at the rear, which is suspended on semi-elliptic springs forward and on the three-quarters elliptic scroll springs at the rear. The steering gear is an irreversible worm and wheel type with the steering column at the left side. The gear shifting and emergency brake levers are at the centre. The service brake pedal actuates contacting bands on the external face of, and the emergency brake shoes expand within the drums on the rear wheels.

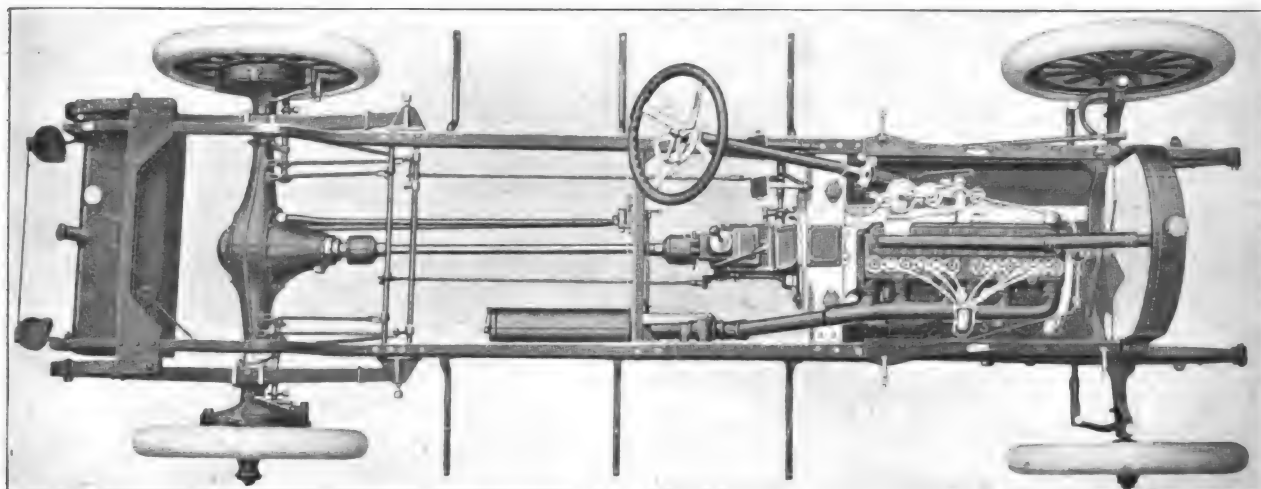
Model 4-43 Chassis.

The 4-43 chassis has a four-cylinder water-cooled four-cycle T-head type motor with

4-36 touring body will seat five passengers, and the touring body of model 4-43, six passengers.

Model 6-40 Chassis.

The model 6-40 chassis is 126 inches wheelbase and 56-inch tread. The power plant is a unit, carried on three points. The motor is a six-cylinder water-cooled four-cycle L-head type with the cylinders cast en bloc, having bore of $3\frac{1}{2}$ inches and stroke of five inches, this giving a horsepower of 29.40 by the S. A. E. formula. This motor is cast with the water jacket heads separate, this affording accessibility to the combustion heads and expansion chambers. The cylinders and pistons are carefully machined and fitted, the pistons having three concentric expansion rings. The crankcase is aluminum, with the oil reservoir cast separately. All bearings are mounted in the crankcase. The crankshaft is



Top View of the Model 6-40 Chassis in Which Is a Three-Point Suspended Power Plant with the Six-Cylinder Motor En Bloc.

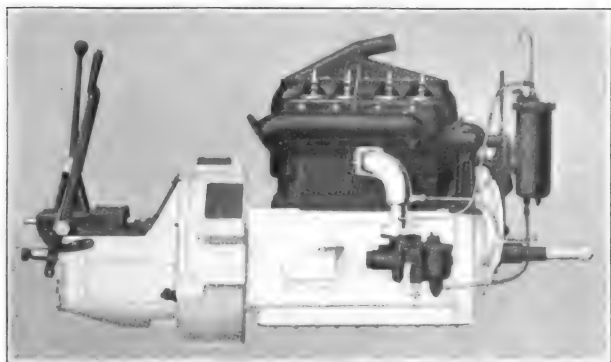
the cylinders cast en bloc, with cylinder bore of $4\frac{1}{2}$ inches and stroke of five inches, this having a horsepower rating of 32.40 by S. A. E. formula. The clutch is a unit with this motor, which is carried on three points. In general characteristics it is the same as the motor of the 4-36, but the radiator is a honeycomb type and the ignition current is supplied by a high-tension magneto. The lighting and starting motor current is supplied by a generator and storage battery. The clutch is coupled with the transmission gearset by a shaft with two universal joints. Both motor and gearset are installed in a sub-frame. The drive is by shaft with universal joints to a full floating rear axle. The wheelbase is 120 inches and the tread 56 inches.

Both the 4-36 and the 4-43 models are equipped with 36 by four-inch tires. The model

large size, carried on three generous bearings, with a thrust flange either side of the centre bearing. The connecting rods are I section steel drop forgings. The connecting rod crankpin bearings and the crankshaft bearings are nickel-babbitt in bronze shells. The camshaft is a steel drop forging with the cams integral, which is mounted on three white bronze bearings. The timing gears are helical cut, the set of crankshaft, camshaft and pump shaft gears being housed in an extension of the motor case.

The valve tappets are a mushroom type, fitted in guides on the base flange, that are adjustable. The valves have nickel steel heads electrically welded to carbon steel stems. The valves are enclosed. The lubrication is by a combination force feed and splash system, the main bearings being flooded, oil pockets for the camshaft being

filled, and the wristpins being supplied from the direct feed, and the other components being lubricated by splash. The carburetor is an auto-



The Unit Power Plant of the 4-36 Chassis.

matic float feed type. The ignition, starting and lighting current is supplied by a generator and a storage battery. The cooling is by a circulation of water through a cellular radiator, forced by a gear-driven centrifugal pump, and cooled by a belt-driven fan.

The Power Transmission System.

The clutch is a leather-faced cone and the transmission gearset is a sliding gear selective type, having three forward speed ratios and reverse. The driving shaft is fitted with two universal joints between the gearset and the full floating rear axle. The torque is taken by a torque arm extended from the rear axle housing to the centre cross member of the frame, the forward end being spring mounted. The forward axle is an I section steel drop forging. The pressed steel frame is cambered at the rear and is suspended on semi-elliptic springs forward and three-quarters elliptic scroll springs at the rear.

The steering gear is an irreversible worm and wheel type with a ball connection to the tail lever. The steering wheel, carrying the spark and throttle levers, is at the left side. The service brake, operated by a foot pedal, is external contracting on the rear wheel drums, and the emergency brake, internal expanding, operated by a hand lever, is with shoes fitted within the same drums. The speed ratio changing and the emergency brake levers are at the driver's right. The wheels are equipped with 34 by four-inch tires. The touring body is adapted for six passengers.

Model 6-47 Chassis.

The model 6-47 chassis has a wheelbase of 135 inches and tread of 56. It is equipped with a six-cylinder water-cooled four-cycle I-head type with the cylinders cast in pairs, with bore of $3\frac{3}{4}$ inches and stroke of $5\frac{1}{4}$ inches, the horsepower

rating by the S. A. E. formula being 33.75. The engine is very carefully designed and constructed, the characteristics being very similar to those of the 4-43 chassis, but having two additional cylinders. The lubrication is by a constant level splash system that is positively fed by two plunger pumps that flood the bearings and insure sufficient lubricant being in the oil pools beneath the crank throws. The motor is cooled by a circulation of water, forced by a gear-driven centrifugal pump through a radiator of honeycomb construction, that is cooled by a large belt-driven fan. The carburetor is an automatic float feed type. The ignition is by a high-tension magneto. The current for the lighting system and for the starting motor is supplied by a generator and storage battery.

The clutch is a cone type and this is coupled with the gearset by a shaft with a universal joint. The motor and gearset are mounted in a sub-frame to prevent stresses from chassis distortion. The driving shaft is mounted with two universal joints between the gearset and the full floating rear axle. The forward axle is an I section. The frame is constructed of pressed steel channel section well reinforced and strengthened by heavy gussets. This is mounted on semi-elliptic springs forward, and on underslung three-quarters elliptic scroll springs at the rear.

The steering gear is an irreversible worm and wheel design, with linkage having compensations for wear. The steering wheel is at the left side



The Auburn Instrument Board and Control.

and on this is mounted the throttle and ignition levers. The clutch and the service brake, the latter being an external contracting type, are oper-

ated by foot pedals, and the speed ratios changing and the emergency brake lever, the latter actuating internal expanding shoes, are at the driver's right. Both brakes operate on and in drums on the rear axles. The tire equipment is 37 by 4½-inch shoes. This chassis is equipped with a six-passenger touring body.

The chassis are noticeable for the provisions for protecting and lubricating the moving parts and the accessibility of the power plants and the components. The bodies are streamline design, slightly and pleasing, and are excellently upholstered and finished.

VIBRATION INJURES CAR'S FINISH.

The proper material for the finish of automobiles has been the subject of long years of experimentation, the engineers and chemists recognizing that the finished surface of an automobile is subject to a much greater strain from vibration than a railway car or horse drawn vehicle. The chemists of the Pierce-Arrow Motor Car Company, Buffalo, N. Y., have tested out finishes under all sorts of conditions, until they now announce that they believe they have the perfect combination of materials essential to endurance and perfect appearance. Where a century ago it was thought that four or even six months was not too long a period in which to achieve the best results in coach finishing, the Pierce-Arrow company has adopted advance methods and modern materials has cut the time down to as many weeks and less.

HOW CORD TIRES ARE MADE.

The Goodyear Tire and Rubber Company, Akron, O., states that so many erratic definitions of the terms and descriptions of cord tires are made that it is well at this time to give an accurate description. Inasmuch as the company has been making cord tires for about 11 years, it can be considered an authority upon the subject.

A cord tire is so called because its carcass is built of layers or plies of parallel cords instead of full woven (or cross woven) fabric. Of course the strength of the cross woven fabric is obtained in cord tire by laying certain plies of parallel cords in one direction and other plies in a cross direction. This construction makes for maximum resiliency, which is especially essential in tires for electric cars, where current consumption is easily affected. Goodyear cord tires are made in the no-rim-cut type, and are built with

an average of 30 per cent. greater air capacity than usual cord tires. As air carries the load, the result of this over-size is obvious, the company explains. These tires are built for gasoline cars as well and fit practically all size rims.

SHREWD BUYERS OF AUTOMOBILES.

Stewart McDonald, vice president of the Moon Motor Car Company, St. Louis, Mo., states that the shrewdest buyers of motor vehicles are located in New York City, while the motorists of Los Angeles, Cal., rank next in critical buying. Third in the line, according to Mr. McDonald, are probably the farmers of Iowa, "who seem to get their entire literary training out of automobile catalogues." Mr. McDonald further states that eight carloads of Moon cars were shipped to New York City during a recent week, and at the same time the factory received an order for a shipment of cars to Sidney, Australia.

BUMP RECORDING DEVICE.

A device to register the condition of highway surfaces is being used in Cleveland, O. It is a recorder encased in a small box and carried on the floor of the automobile. Clock work in the recorder revolves a disk on which is a cardboard blank. A pen marks a continuous line on the card; but at every hole or surface obstruction it marks two jogs in the continuous line as the car rises and falls on its springs.

FRANCE WANTS AMERICAN TOURISTS.

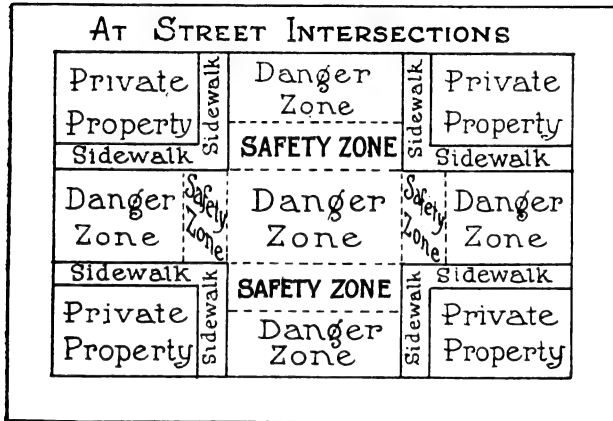
Contrary to expectations based on the European conflict, the president of the Touring Club of France states that it is not only possible and proper for Americans to tour through France during the war, "but it would be agreeable and appreciated by the French people to have Americans visit France as usual. The roads generally are in excellent condition, and all accommodations are ready for the opening of the season. The Touring Club of France will give its assistance in attending to all formalities made necessary by martial law."

The total freight car shipments of automobiles for March, 1915, were 16,316 carloads, making an increase of 25 per cent. over March, 1914.

It is estimated that 200,000 motor cars will be registered this year in New York state.

PLANNING TO MAKE STREETS SAFE.

THE steadily increasing number of deaths and injuries due to vehicular traffic in the cities of the country is bringing forcibly to the atten-



Danger and Safety Zones at Street Intersections.

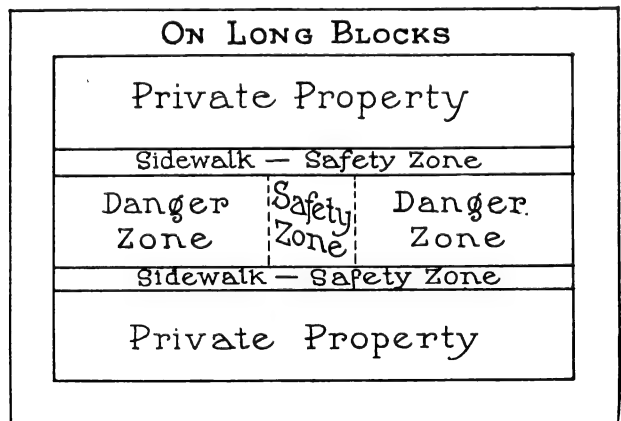
tion of everyone the necessity of establishing regulations that will protect the pedestrian in the streets. The National Highways Protective Society recently stated in a report that 21 persons were killed on the streets of New York City by automobiles during the single month of March of this year. This indicated nearly 100 per cent. increase over the deaths due to automobiles in the corresponding month of 1914. A like increase is being reported in almost all the first class cities of the country.

The consensus of opinion among those who are considered authorities in the field is that the pedestrian is at fault in most cases. Arthur Williams, president of the American Museum of Safety, in an address on street safety before the conference on safety and sanitation, at the Grand Central Palace, New York City, Dec. 14, last, said: "It has been found that a very large percentage of accidents—as high as 85 per cent.—are the result of carelessness on the part of the person injured."

James L. Crawford, who drafted a bill now before the New York state legislature, for the creating of regulations tending toward the protection of pedestrians, states: "Carelessness being a mental defect, it is clear that the fundamental cause of from 85 to 90 per cent. of street accidents is mental. If this is admitted it is obviously necessary, in order to get at the root of the trouble, to adopt a method of regulation of street traffic which will automatically impose a

powerful and continual mental check on all ordinarily intelligent adults—whether drivers or pedestrians—in their use of the streets; a mental check that will compel such adults to exercise that constant care and vigilance which, in the extremely dangerous conditions of present day city traffic, is absolutely necessary to the avoidance of accidents."

A familiar sight throughout the country is the solitary figure of the traffic officer at the intersection of streets where streams of pedestrians and vehicles meet. His warning whistle, his up-raised hand is respectfully heeded by both classes of traffic. He has become one of the most efficient mental checks yet devised. But behind him stands the authority of the law, and, to obtain the same efficiency in any other form of traffic regulation, such regulations must be accompanied by penalties that will deter the reckless and the careless from endangering the lives of themselves and others. Recognizing this, the coroner of Pittsburg recently stated in a report, "We have asked the Pittsburg city authorities to enforce traffic regulations whereby it shall be made a misdemeanor for a pedestrian to cross a street except at the officially recognized and properly marked street crossings. We would urge the police to continue the work of restricting the operations of motor vehicles so as to protect the lives of pedestrians, but, in turn, the pedestrians should play their part in so regulating their movements that there may be no fatal con-

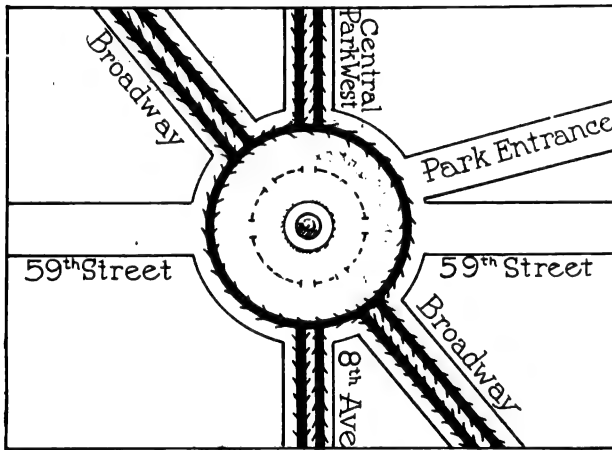


Danger and Safety Zone Laid Out in Long Street.

fusion in street traffic."

The bill aforementioned as being before the legislature of New York state provides for the

division of streets of first and second class cities of the state into safety and danger zones, and the responsibility for accidents occurring within



Traffic System Employed at Columbus Circle, New York.

those zones will be determined by the location in which the accident may happen. The author of the bill declares that the principle of the allocation of the burden of proof according to the location of the accident will act as a powerful check against carelessness and remedy, to a large extent, that mental defect which is the fundamental cause of the great majority of avoidable street traffic accidents.

The terms of the bill as originally presented are given as follows:

Safety and danger zones. All streets within the boundaries of each city of first or second class, shall be divided into safety and danger zones. Each safety zone shall be available for the purpose of enabling pedestrians to cross the track of vehicular traffic in comparative safety, and shall comprise a section of the roadway at each crossing, or intersection of a street. Each safety zone shall have a width of 20 feet from the building line at each intersection of streets, and of 20 feet at right angles to the building line, at any other part of the street, which may be designated as a safety zone by the responsible road authorities. The sidewalks, from building line to curb, shall be safety zones for pedestrians. All other parts of the street, used for the purpose of vehicular traffic, whether mechanically propelled, horse drawn, or otherwise, shall be danger zones for pedestrians.

Presumption of law in accidents. Drivers of vehicles and pedestrians shall be at liberty to use the streets, including both safety and danger zones, subject to police regulations for the time being in force, but in the event of an accident occurring, resulting in the death or injury of any pedestrian, driver or passenger, or in damage to property, through collision with a vehicle on the street, or otherwise, the presumption of law as to the responsibility for the accident will favor the pedestrian, and the driver or owner of such vehicle shall be presumed to be in fault, and to be guilty of negligence or contributory negligence, unless the contrary is proved, if the accident occurs within a safety zone; and the presumption of law as to the responsibility for the accident will favor the driver, or owner of such vehicle, and the pedestrian shall be presumed to be in fault, and to be guilty of negligence or contributory negligence, unless the contrary is proved, if the accident occurs within a danger zone.

Burden of proof Limitation of scope beyond plac-

ing the burden of proof on the driver or owner of the vehicle, or on the pedestrian, in accordance with the location in which such accident occurred, this article shall not affect the existing laws relating to civil or criminal prosecution, or alter in any way the existing road or traffic regulations.

Under the provisions of the proposed law, safety and danger zones would be laid out as is shown in the accompanying diagram. It will be noticed that zones are provided for in unusually long blocks. The author of the bill points out that such a system would not necessarily involve any expense, except in long blocks which might require four posts set at the curbs to indicate the zone limitations. Zones at street intersections are indicated by the curbings, etc.

The proposed bill does not operate to take away the liberties of either the driver or pedestrian. While the latter may cross, or move about, or stand still, on any part of the danger zone of the street, he does so at his own risk; if a vehicle strikes him while in the danger zone the law will presume that he is primarily at fault and the burden of proof will be his to satisfy the court that the accident was due to the culpable recklessness or carelessness of the vehicle driver. In



Dense Volume of Traffic at Fifth Avenue and 42d Street, New York City.

the case of the driver, he may propel his car in any part of the safety zone in the street, but if his vehicle strikes a pedestrian and injures that

person, then the burden of proof rests upon the driver, the court presuming that he is at fault.

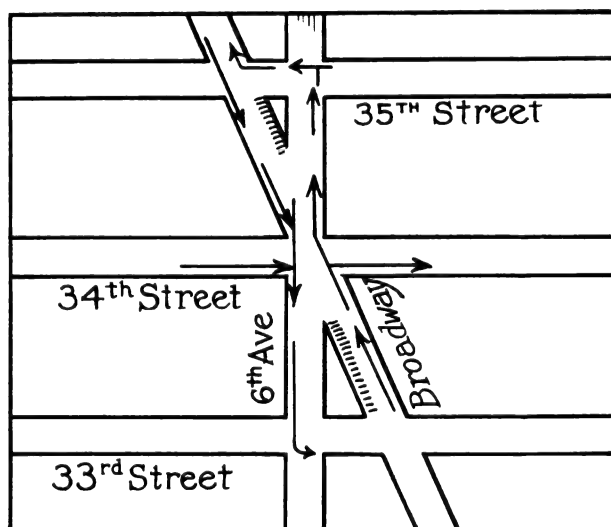
The traffic problems vary in many cities, and in many districts of each city. As an illustration, consider the systems in force in New York City. At Fifth avenue and 42d street a great variety of traffic is constantly in motion. But because the streets intersect at right angles, and there being only two streets, it is comparatively easy for the traffic officer to govern the flow by his upraised hand or whistle. The width of the avenue has made it expedient to establish isles of safety whereon pedestrians caught in the middle of the avenue by the resumption of traffic along the thoroughfare can safely wait until the officer stops the traffic flow.

Conditions at where Broadway, Sixth avenue and 34th street intersect made it necessary for a more complicated system, which is illustrated in an accompanying diagram. As will be seen by following the arrows, a vehicle coming up Broadway must turn off at 34th street and follow up Sixth avenue, and through 35th street back to Broadway. This makes the east side of Broadway above 34th street a safety zone for pedestrians only, as is the west side south of 34th street.

Still another system is in force at Columbus circle. Because of its revolving line of traffic it has been called the rotary system, and is shown in an accompanying illustration. As will be seen, three thoroughfares cross each other, and in the centre of the circle is a monument. Iron standards, connected by rope guides, form a circle of large diameter within which vehicle drivers are forbidden to pass and where pedestrians may stand to await street cars. Vehicles follow the general circle outside of the ropes, always bearing to the right, and consequently the traffic merges into a circular revolving mass.

Boston, with its narrow, winding thoroughfares, presents traffic problems not met with in many other American cities. There it has been found expedient to adopt what is termed as one-way streets and restricted streets. In the former, vehicular traffic is permitted to flow only in one designated direction, while in the latter no vehicles are allowed to pass. The accompanying map shows the one-way traffic zone in Boston, arrows indicating the direction of traffic. This system has been adopted in Philadelphia, where some street cars are also run on the same plan. Traffic experts claim that Chicago's traffic problems, especially in the Loop district, could be solved by adopting the one-way street system.

Less than a year ago Detroit, Mich., adopted what is known as the tennis court system, shown in an accompanying illustration. Important street crossings are ruled off by white lines into safety zones, the lines suggesting the boundary markers of a tennis court. The crossing lanes for pedestrians are virtually extensions of the sidewalk, being about the same width, 18 feet, and are indicated by white lines on the pavement extending the full width of the street. Safety zones are provided for alongside of the trolley car stopping places, they being about 60 feet long and six feet wide, measuring from the car tracks. These too are indicated by white lines, and pedestrians must keep within the lines, just as vehicle drivers are compelled to keep to their side of the lines. When the safety zones are clear and it is



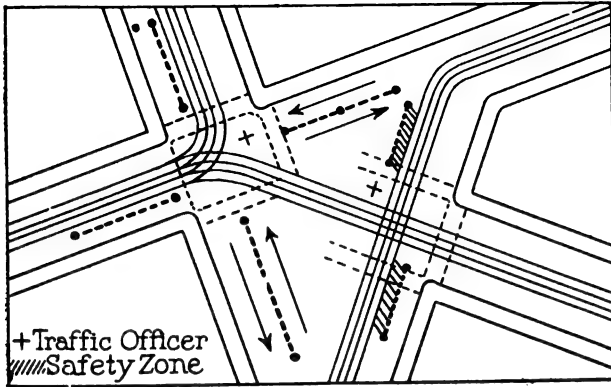
Traffic Routes and Safety Zones at Herald Square, New York City.

safe for traffic to proceed across the crossing lines, the traffic officer so signals.

Legal precedent has already been established in the case of injuries sustained in a safety zone. A California court decided that a person who alights from a street car within a safety zone in the street, but does not look to see whether there is any danger in that zone, is not negligent in case of injury. The decision was rendered in a case wherein a woman was struck by an automobile as she was alighting from a street car. The defendant contended that the woman was negligent, and, therefore, partly responsible for the accident, because she had not looked to see whether there was any danger. The court held that she had a right to assume that the safety zone would be perfectly safe for her, and her failure to look for danger could not be construed as

negligence, but the driver of the car violated the law by driving into the safety zone.

No one is more anxious than the average mo-



How Detroit Is Handling Its Traffic Problems.

torist to have efficient regulations established that will minimize, if not eliminate, the danger to pedestrians. Along these lines is the nationwide propaganda for "safety first", the ordinances being adopted almost universally requiring automobile and other vehicle drivers to stop when a street car is discharging passengers, and prohibiting drivers from passing around a standing car on the right side. However, the unprejudiced person will acknowledge that, as Mr. Williams stated, a large proportion of the accidents are traceable to carelessness on the part of the pedestrian, and for that reason regulations should be made so comprehensive as to include the pedestrian and hold him to his own responsibility.

That the question of the crossing of two congested thoroughfares becomes more and more acute is evident from the large number of individuals and societies now working for a solution. The Municipal Art Society, New York City, has offered three cash prizes for the best solutions, they being given as \$300, \$200 and \$100. "Experience in certain European cities" is the declaration of the society, "has shown that by proper planning such congestion may be considerably lessened and at the same time the actual cost of the change may be covered by the increased value of the properties abutting on such improvement."

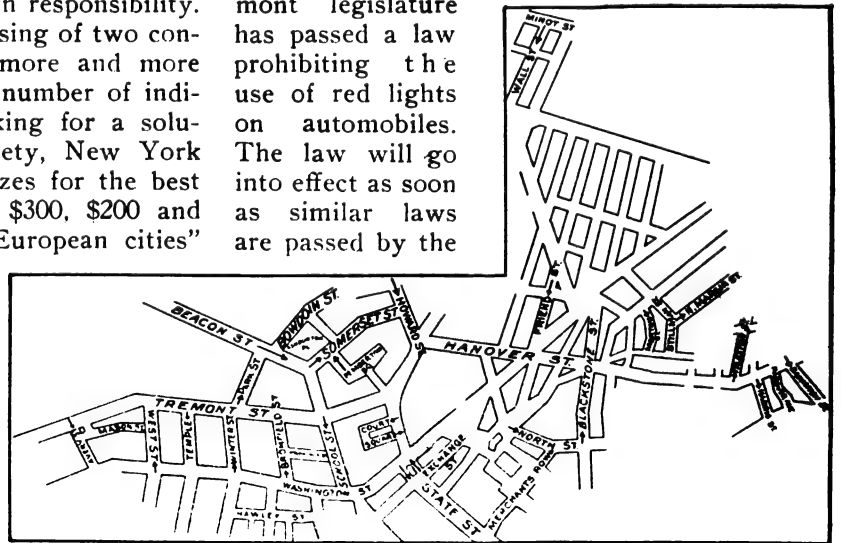
The competition is open to architects, engineers and any others interested, and the proposition given by the society is the crossing of two very important thoroughfares, both supposed to

be 100 feet wide, one having street car tracks, while the other has none. Competitors have the privilege of condemning any part of the four adjacent blocks, for the putting through of new streets, the changing of the positions of the present streets, the changing of the levels, or whatever they think most desirable.

Motorists in a circular issued by Job Lippincott, state commissioner of motor vehicles of New Jersey, are asked to provide for the dimming of headlights as a measure of safety.

DANGER OF RED TAIL LIGHTS.

Railroad officials attribute a number of disastrous wrecks to red tail lights on the rear of automobiles, not to mention frequent delays to fast expresses and the demoralization of engineers' nerves from the same cause. They point out that many highways run closely parallel to railroad tracks, and, at night, the red tail light on an automobile is not distinguishable from the danger signal of track man. This causes the engineer to slow down or stop, until he finds the true identity of the light. Frequent repetition of such incidents tend to make the engineer careless, until some night he runs by a danger signal, believing it to be an automobile light, and maybe a disastrous wreck is the result. While the contention may be far-fetched, there is plausibility in it, and recognizing the possibility, the Vermont legislature has passed a law prohibiting the use of red lights on automobiles. The law will go into effect as soon as similar laws are passed by the



One-Way Traffic Zone of Boston's Streets.

neighboring province of Quebec and the states of New Hampshire, Massachusetts and New York. Such a law has been adopted by Quebec.

PRACTICAL MOTOR CAR REPAIRS.

THE lift of a motor valve is very important, for if the opening be restricted in any way, the passage of the fuel mixture or the egress of the burnt gases will be impeded. This subject comes under valve timing and it is essential that

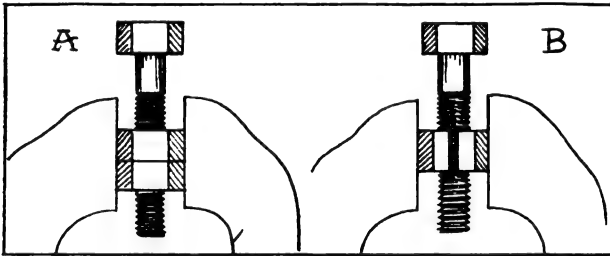


Fig. 20—Holding Threaded Parts in a Vise: A, Use of Two Nuts; B, Use of Slotted Nut.

the valves open and close according to the timing of the motor, the number of degrees varying with the design.

The amount of lift may be noted by the application of the device outlined in Fig. 21 A, which is employed for setting valves and making adjustments in a repair shop. It may be made from sheet metal or any suitable pieces of old material. The indicating hand may be secured from a discarded clock or made from brass, the latter being preferable, as it can be bent to drop over the cylinder block walls surrounding the valve. A spring is attached as illustrated to hold the pointer in a fixed position.

The scale of the dial can be marked with a chisel or a punch, or the metal can be left smooth and a piece of clean paper pasted on it whenever it is used, and the position of the pointer can be noted by pencil marks. This will be a means of insuring accuracy, because there will be no possibility of confusion.

The indicator can be used for determining any facts with reference to the timing or the lift of the valves, and as the pointer is of considerable length the movement will be multiplied, so that a very slight variance can be seen, and adjustments can be made extremely close. The beginning of the lift can be noted and the movement of the valve followed as desired. A comparison of the valves can be made so as to deter-

mine accurately the relation of their opening.

In practise the indicator is placed on the cylinder head, with the lower end of the pointer resting on the head of the valve, which should be seated. The engine is then slowly turned until the valve has reached the top of its stroke, and then the reading of the dial can be noted or the paper can be marked. With this as a standard the remainder of the valves can be tested. With the paper on the dial a fresh surface can be had every time it is used, and there will be no uncertainty as to indication.

HOLDING PIPE AND ROD.

The ordinary vise in use in a shop will hold flattened or rectangular objects firmly enough, but often when work must be done on a pipe or rod and considerable force must be exerted, the rounded parts cannot be clamped so as to be immovable. A pipe vise is the equipment that should be used if there is much work of the character stated, but if this is not available a satisfactory substitute is a common monkey wrench, which is to be used in combination with the vise. Usually the sizes of wrenches obtainable will suffice for what work may be necessary in connection with a motor vehicle. In using this the wrench should be opened to almost the diameter of the pipe or rod to be worked on and placed with the part in the vise and clamped as is indicated at Fig. 21 B. The edges of the wrench will hold the object so that it cannot be turned, and it can be placed at any angle at will.

CLAMPING THREADED PARTS IN VISE.

It is often necessary to grip a bolt or other threaded piece in a vise, for the purpose of filing

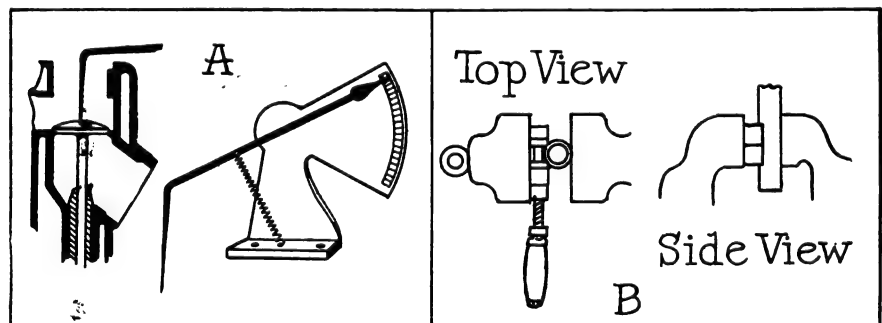


Fig. 21—A, Indicator for Testing Valve Movement and Lift; B, Method of Holding Round Pipe and Rods in a Vise.

or chipping the head. A good method to hold the work and preserve the thread is as follows: Take a nut that will fit the threaded part and slot

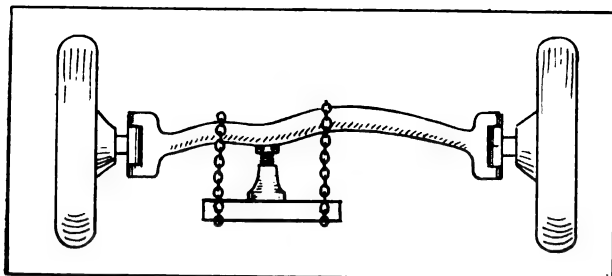


Fig. 22—Method of Straightening a Bent Axle with a Screw Jack Without Heating.

one side of it with a hack saw, as is shown in Fig. 20 B. Screw the nut on the bolt and clamp in the vise as shown. This affords a sure grip on the bolt and will hold it stationary under any pressure.

Another method which will also hold a bolt solidly by the thread is to turn two nuts against each other on the threaded portion until they are good and tight and until the faces lie in the same planes, so they will clamp properly in the vise as is shown in Fig. 20 A.

STRAIGHTENING A BENT AXLE.

Axles frequently become bent from accident and other causes and must be straightened by one or two methods. They can either be made true to form by heating and hammering to the original shape, or they can be bent by pressure while cold. The second process is considered preferable because heat will materially affect the metal, especially if heat treated. A simple device for bending an axle while cold that can be used with good results is as follows: Procure a piece of steel bar or shaft that is stronger than the axle and attach it to the part of the axle that is to be straightened by two strong chains, as shown in Fig. 22. Now place a screw jack in position between the steel shaft and the axle and by exerting pressure on it the axle will be steadily bent to the desired form. The advantage of this method is that the straightening can be done without removing the axle from the machine and the equipment can be procured in almost any place.

ENGINE MUFFLER MADE OF FUNNELS.

A home-made gas engine muffler that will serve in an emergency and not materially affect the power of the motor can be constructed as follows: Procure a piece of stove pipe (B) the length of the old muffler and a number of tin funnels that are of the stove pipe size at the large end. Cut off the funnels as indicated in Fig. 23A. Slip these cut-off funnels into the stove pipe and fasten the bell ends with small stove bolts in about four places about the pipe (C). In fitting the funnels they should be so placed that the small ends come in exact lines with the large ends, as is shown in Fig. 23 B. Place the funnels in this manner until the entire space in the pipe is taken. The ends (E) are made of small cast iron plates turned so that they fit inside the pipe, and these are secured by machine screws. One plate is drilled in the centre so as to emit the exhaust and the other is drilled and threaded so as to receive the exhaust pipe (F).

The funnels should be so placed that the small holes in them will be in a direct line, which will afford a free passage for the exhaust gases to escape, and this construction will not materially affect the silencing of the engine. The muffler will not become clogged as will many silencers that are built with many baffle plates perforated with small holes.

LOCKING A MOTOR CAR.

Owing to the great number of motor car thefts, which appear to be increasing in frequency, especially in the large cities, every owner of an automobile should provide some means of protecting his property when left unattended. For those who have the selective type of transmission gearsets, a good method that is illustrated in Fig. 24 A has been found practical for locking the car. A hole is drilled through the side of

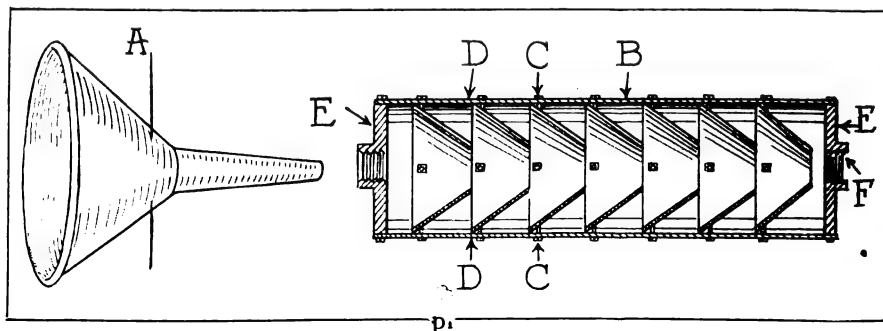


Fig. 23—Muffler Constructed of Stove Pipe and Funnels: A, the Funnel Marked for Cutting; B, a Cross-section of the Assembly.

the quadrant in which the gear shifting lever works. Place the lever in the reverse position and drill a hole directly in front of it. A padlock

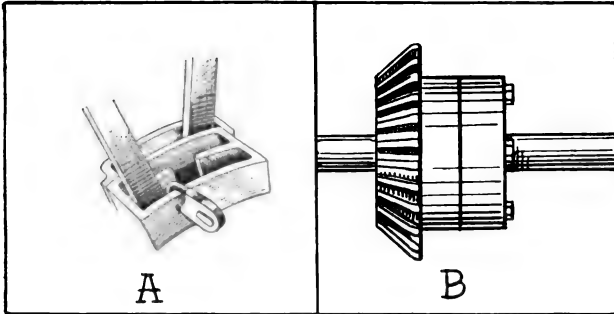


Fig. 24—A, Car Locked with Speed Changing Lever in Reverse; B, Master Gear Ground to Quiet Noise in Differential Housing.

may now be inserted in this hole and by locking it the car can only be operated in reverse gear. The cost of this protection is very small and by its use the owner does not affect the appearance of the vehicle.

TIRE CHAINS ALWAYS NECESSARY.

This is the time of the year that tire chains should be carried in the car and not left at home. Many of the public highways are receiving applications of crude oil and traction at times becomes difficult. Not infrequently, when the brakes are applied, the car will skid and skidding may result in an accident. When uncertain traction obtains the chains should be adjusted, for if the operator fails to protect his passengers he is in a sense criminally negligent.

SILENCING A NOISY DIFFERENTIAL.

Many cars, while running at moderate and high rates of speed, are noticeable for an annoying humming sound that can be traced to differential. Usually this is caused by the pinion gear

on the drive shaft coming in contact with the master gear on the differential housing. The writer recently had experience with a car in which such a sound was a great annoyance and found the following remedy: After trying several adjustments between the two gears, the differential assembly was removed from the axle. After disassembling the differential the master gear was ground to form a small bevel on the teeth at the top side, as shown in Fig. 24 B. When the differential was again placed in the axle and adjusted the noise had ceased.

TEMPORARY SPRING REPAIR.

Many times when the spring of a car breaks the machine cannot be operated until the spring has been repaired. When such an accident hap-

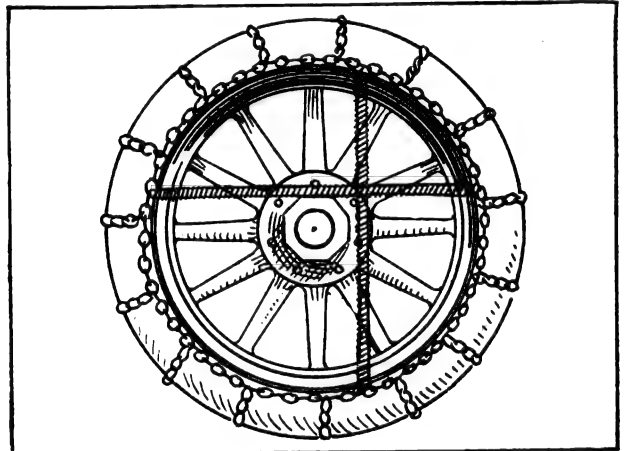


Fig. 26—Tire Chains Kept Tight with Pair of Door Springs.

pens a temporary repair that will usually hold the weight of the car can be made from a piece of wood and a block. If the break is near the end of the spring, as shown in Fig. 25 A, block should be placed over the break and the strip of wood put on the block and bound at each end, preferably with soft wire. If the break is in the centre the blocking should be placed as in Fig. 25 B. If a break should happen with a full elliptic spring, a temporary repair can be made by placing a block between the two sections and securely strapped as shown in Fig. 25 C. This block can be made from a piece of inch board, to fit between the spring and lashed with wire through holes in the block and around the spring sections.

HOLDING TIRE CHAINS TIGHT.

Skid chains used on tires should not be allowed to sag, as this condition will result in dam-

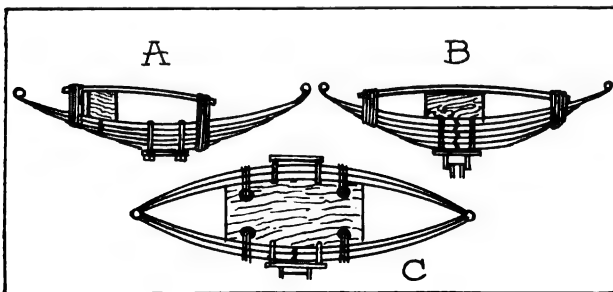


Fig. 25—Temporary Spring Repairs: A, Semi-Elliptic Broken Near End; B, Same Broken at Centre; C, Full Elliptic Blocked with Section of Board.

age to the shoes. Loose chains are also very noisy. A very inexpensive way to keep the chains tight and efficient is to purchase ordinary

first applying the squared and then the tapered end the grease can be quickly forced out of the funnel into the housing. The filler is clearly shown in Fig. 27 B.

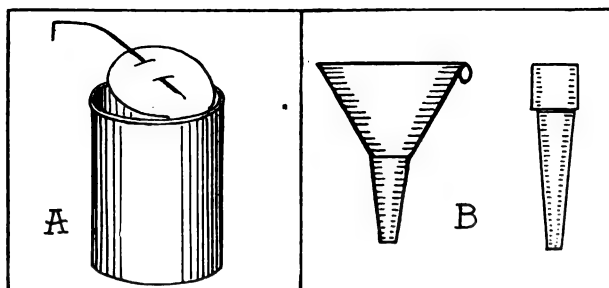


Fig. 27—A, Surface Gauge Extemporized from a Tin Can; B, Filler for Greasing Differential Housings and Gear-set Cases.

screen door springs and attach them to the chains at right angles, as is shown in Fig. 26. This will require two springs for each wheel. The cost of the springs is trifling and the satisfaction and tire economy will be surprising.

EXTEMPORIZED SURFACE GAUGE.

Very frequently a surface gauge can be used to decided advantage in a repair shop, for such a tool will insure accuracy of work. If a gauge is necessary a very satisfactory substitute can be extemporized from a tin can from which the cover has not been entirely cut, or, if the top is missing, the bottom can be cut with a knife or opener for about three-quarters of the circumference. The top or bottom can be bent to any desired angle. In this two slits are cut, and into these a piece of wire forced so that it can be moved backward and forward. With this adjustment of the wire, and the bending the cover, a very accurate measurement can be taken. In using this the bottom of the can should be placed on a level surface and the height taken by the wire. The gauge is illustrated at Fig. 27 A.

GREASING GEAR HOUSINGS.

When greasing a transmission gearset or differential gear, it is often difficult to force the grease into the small holes in the housings for applying the lubricant. These assemblies require considerable quantities of grease and if a small grease gun is used the task is tedious. An easily made filler for greasing is made from an ordinary tin funnel and a stick that can be whittled into shape with a jack knife. Form the stick on one end so that it will taper into the nose of the funnel and the other end should be cut square. By

PULLING OUT OF THE SAND.

If a car is carefully handled it will many times go through sandy places without losing the traction of the wheels. If the car is driven very slowly, preferably in low gear, through the sandy places the wheels will keep their traction and pull through. Never try to race the motor through the sand, as the wheels will spin and sink deeper into the sand. This fact is true of the steam locomotive, which will pull many times its own weight. When the start is made the wheels are turned very slowly until the great burden is in motion, after which a little more speed may be used. If the steam locomotive were started quickly the wheels would spin and all steam will have to be shut off and a new start made. If the car is equipped with pneumatic tires and has lost traction in the sand, it may be advisable to reduce the air pressure in the tires, thus allowing them to spread and afford a larger traction area. Of course the air pressure must be restored when the wheels have reached solid ground.

TEMPORARY BATTERY TERMINALS.

Good connections on the ends of wires for batteries can be made from cotter pins that are about $1\frac{1}{2}$ inches long, as shown in Fig. 28 A. The end of the wire should be bared and bound around the pin as shown in Fig. 28 B. It should now be bound with tape and connected with the binding post of the battery, as is shown at Fig. 28 C.

CARRYING A TOW ROPE.

Nothing can be more useful in the regular equipment of a car, especially if long drives are

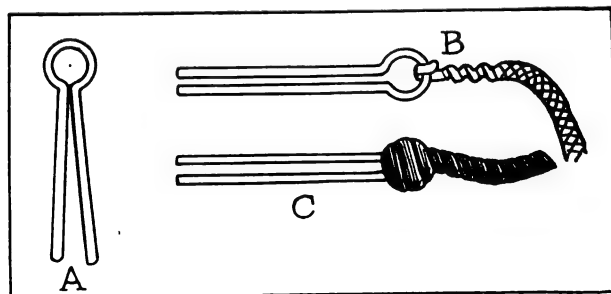


Fig. 28—A, Cotter Pin; B, Wire Connected to the Loop of the Pin; C, Terminal Taped and Ready for Installation.

taken, than a good, substantial tow line. A small steel cable will best serve for this purpose, as it is strong and yet takes but little space in the car.

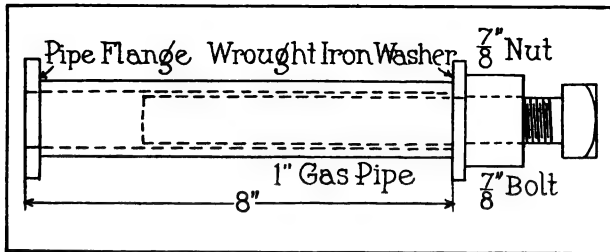


Fig. 29—Quickly Constructed Home-Made Lifting Jack of Great Power and Utility.

It can be conveniently coiled and has many advantage over a rope. There are many times that a tow line will be found helpful aside from pulling a disabled car into a repair shop. Often the wheels will lose traction in the sand and after all attempts to regain traction have failed, it may be necessary to apply a tow line and be pulled out by some greater force. There may be times that the motor is working badly and will not climb a steep grade, and at these times a tow line will be very handy.

A HOME-MADE JACK SCREW.

A small jack is often very useful and if one is not obtainable a very substantial tool can be made in about 10 minutes if the necessary parts are at hand. Those required include a bolt about $\frac{7}{8}$ of an inch diameter and eight inches long, one washer, a piece of one-inch gas pipe about eight inches long, and half of a one-inch pipe flange.

Run the nut to the head of the bolt and place the washer under the nut and insert the combination into the gas pipe, which in turn is inserted into the pipe flange. By screwing down on the nut the bolt will be forced upward with the object under which it is placed. The tool in its construction form is shown in Fig. 29.

CAUSES OF MOTOR SKIPPING.

Sometimes the motor will run smoothly when fully or partially throttled, but will miss when the throttle is widely opened and the load taken on. This may be an indication of weak batteries, a break in the cable leading from the coil to the spark plug, a break in the windings of the coil, or it is possible that the points of the spark plugs are set too far apart. In case of a leak, or too widely separated points of the plugs, the resistance may be greater than that of the

plug, in which case the missing may not happen, but as the speed increases the compression becomes greater and the resistance at the sparking points increases until it exceeds that of the break. As the current will follow the path of least resistance, it will escape through the break and the motor will miss. The leak should be immediately located and the defect remedied or the damaged part replaced.

DRILLING A CRANKSHAFT BY HAND.

When the crankshaft pin of a motor shears off, it is necessary to drill out the broken part of the pin. This may be done by the method illustrated in Fig. 30 without disassembling the car. The car should be jacked and a carpenter's brace, with the proper drill set below and the handle fastened to the floor or a piece of board by driving nails around it. As the drilling proceeds the car should be gradually lowered, thereby feeding the drill with its own weight. A ratchet brace should be used, as the axle may prevent a full turn. This method of drilling can be easily applied to many jobs instead of using chain drills.

A MIRROR IN A TOOL KIT.

A mirror of the round, vest pocket type is a handy addition to any tool outfit. It may be used either in the day time or night to reflect the rays of light into dark places of the car when seeking a lost nut or cotter pin.

TURNING AND BORING COPPER.

Many mechanics claim that milk is superior to either soapy water or turpentine as a lubricant for the tool while turning copper, while tallow is the simplest and cheapest to use when drilling it. Both of these are always obtainable.

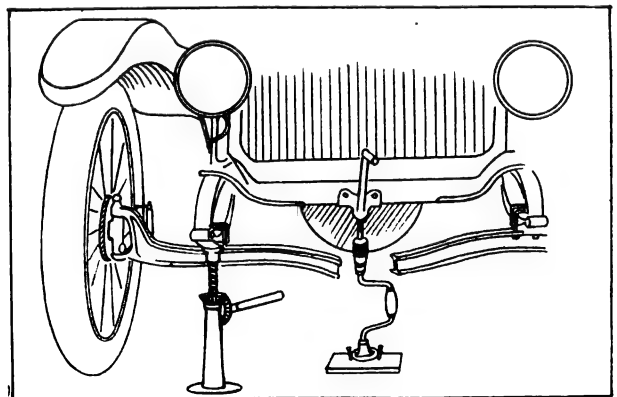


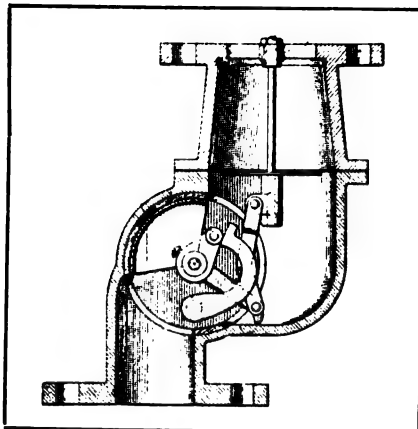
Fig. 30—Drilling Broken Crankshaft Pin with Hand Tools, the Weight of the Car Feeding the Drill.

NEW PATENTS FOR AUTOMOBILES.

Spark Plug, Eugene Bauer, Stuttgart, Germany, assignor to the firm of Robert Bosch; No. 1,127,390. Filed Oct. 26, 1911.

Axle Housing, F. C. Burkhardt, Buffalo, N. Y., assignor to the Crosby Company; No. 1,127,399. Filed June 26, 1914.

Engine Governor, B. G. Kramer, Milwaukee, Wis.; No. 1,127,644. Filed June 20, 1913; renewed April 17, 1914.



Engine Governor; No. 1,127,644.

ton, Cal.; No. 1,127,503. Filed Dec. 10, 1912.

Vehicle Spring, R. R. Potter, Mt. Vernon, N. Y.; No. 1,127,511. Filed May 26, 1914.

Vehicle Tire, E. M. Richardson, Chicago, Ill., assignor of one-half to F. E. Hammond; No. 1,127,517. Filed Feb. 15, 1912.

Automobile, J. F. Sloan, Peoria, Ill.; No. 1,127,533. Filed Feb. 12, 1912.

Nut Lock, C. H. Willison, Ashland, Ore.; No. 1,127,559. Filed May 12, 1914.

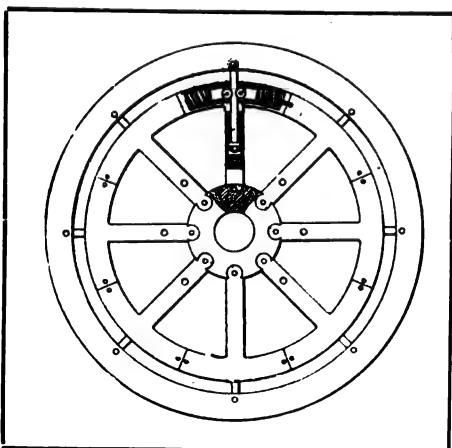
Internal Combustion Engine, W. C. Carter, St. Louis, Mo., assignor to Carter Carburetor Company; No. 1,127,590. Filed Nov. 6, 1911.

Combined Speedometer and Speed Controller, B. D. Emanuel, Hamilton, O., assignor to Pierce Speed Controller Company; No. 1,127,607. Filed Jan. 24, 1913.

Spring Suspension, A. B. Ferguson, Spokane, Wash.; No. 1,127,608. Filed April 13, 1914.

Valve Lifter, Fredrik Fischer, New York City; No. 1,127,610. Filed Dec. 23, 1913.

Piston Ring, G. A. Hendrickson, Chicago, Ill.; No. 1,127,619. Filed May 2, 1914.



Automobile Wheel; No. 1,127,960.

ism, S. K. Montgomery, Cullom, Ill.; No. 1,127,664. Filed May 4, 1914.

Vaporizer and Carburetor, R. U. Wolfe, Omaha, Neb.; No. 1,127,709. Filed March 20, 1914.

Fastener for Automobile Chains, Jacob Faus, Jr., Boulder, Col.; No. 1,127,423. Filed May 9, 1914.

Tire Holder, Walter R. Green, Chicago, Ill.; No. 1,127,432. Filed Dec. 15, 1913.

Chain Tire Grip, W. B. Lashar, Bridgeport, Conn.; No. 1,127,458. Filed Feb. 29, 1912.

Tractor, E. J. Patterson and F. S. Moore, Stock-

Motor Starter, N. T. Woods, Portland, Ore., assignor to E. C. Dahl; No. 1,127,710. Filed Dec. 20, 1913.

Piston Ring, H. E. Woolery, Fairmont, Minn.; No. 1,127,711. Filed Oct. 28, 1914.

Ratchet Wrench, H. L. Ash, Sommerset, Penn.; No. 1,127,717. Filed June 3, 1913.

Lock for Automobiles, W. H. Rodgers, Philadelphia, Penn.; No. 1,127,519. Filed July 3, 1913.

Rotary Engine, George Beuoy, Cedar Vale, Kan.; No. 1,127,723. Filed Nov. 29, 1913.

Tire Armor, E. J. Dugan, Jeannette, Penn.; No. 1,127,744. Filed Dec. 4, 1913.

Internal Combustion Engine, Hugo Junkers, Aix-la-Chapelle, Germany; No. 1,127,772. Filed Jan. 2, 1913.

Removable Cylinder Lining, W. A. Leimer, Denver, Col.; No. 1,127,783. Filed June 27, 1914.

Rim, J. C. Lewis, Brookline, Mass., assignor to Presto Inter-Rim Company; No. 1,127,785. Filed Oct. 8, 1913.

Wrench, Augustus Liese, South Lancaster, Mass.; No. 1,127,786. Filed April 16, 1914.

Tread for Tires, E. McCoy, Detroit, Mich., assignor of fifty-two one-hundredths to J. N. Courtney and C. H. H. Wheeler, and forty-eight one-hundredths to J. N. Courtney; No. 1,127,789. Filed Dec. 31, 1910.

Elastic or Cushion Wheel, C. P. McMullen, Lyndhurst, N. J., assignor of one-fourth to G. S. Helmken; No. 1,127,790. Filed March 22, 1913.

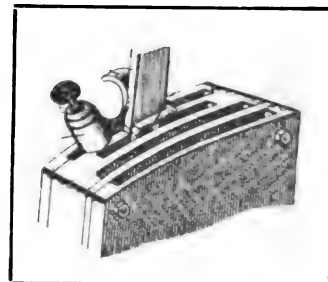
Explosive Engine, Frank Mueller, Allentown, Penn.; No. 1,127,799. Filed Dec. 12, 1911.

Rim, Burgess Darrow, Akron, O., assignor to the Goodyear Tire and Rubber Company; No. 1,127,412. Filed Feb. 12, 1914.

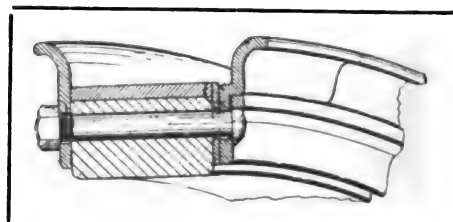
Ignition Timer, J. T. Pedersen, Flushing, N. Y.; No. 1,127,805. Filed Feb. 4, 1914.

Internal Combustion Engine, J. R. Rogers, Brooklyn, N. Y.; No. 1,127,810. Filed March 31, 1911. Renewed July 6, 1914.

Demountable Rim, D. I. Selfridge, Washington, D. C.; No. 1,127,813. Filed Oct. 2, 1913.



Auto Lock; No. 1,127,519.



Auto Rim; No. 1,127,412.

COMING EVENTS.

April.

April 30-May 1-2—Track race, Portland, Ore.

May.

May 5-6—Motor truck convention of N. A. C. C., Detroit, Mich.

May 8—Track meet, Salem, Ore.

May 15-16—Track race, Vancouver, Wash.

May 23—Track meet, Centralia-Chehalis, Wash.

May 29—500-mile race, Indianapolis, Ind.

June.

June 9—Track meet, Galesburg, Ill.

June 14-17—Summer meeting, S. A. E., Detroit, Mich., and cruise.

June 19—500-mile race, Chicago, Ill.

July.

July 3—300-mile race, Sioux City, Ia.

July 4—Road race, Tacoma, Wash.

July 4—Road race, Oshkosh, Wis.

July 4—Road race, Visalia, Cal.

July 5—Speedway races, Omaha, Neb.

July 9—100-mile track race, Burlington, Ia.

July 31—Road race, Denver, Col.

AUTO MOTOR HAULS FREIGHT CARS.

An unusual use is being made of a Pierce-Arrow 66-horsepower motor which is now hauling freight cars for the Pennsylvania railroad in Baltimore, Md. This motor, which is the same as is used in pleasure cars and is equipped with an engine starter and electric lighting plant control board, is installed in an electric tractor, which was built in the railroad company's shops when the Baltimore officials enforced the ordinance that prohibits haulage by steam locomotives through the streets on the "block route." The eight-horse teams used were complained of by business men because of their slowness, and the company adopted the electric tractor. A General Electric generator is directly connected to the Pierce-Arrow engine, which furnishes power direct to the two electric motors on the two axles for the four-wheel drive. The engine runs at a constant speed of 850 revolutions a minute. Herringbone gears connect the driving motors with the wheels. Every bearing from motors to and including the wheels is of the D. W. F. type, some of them being nine inches in diameter. Steering is by all four wheels, which are equipped with block rubber tires. The radiator is mounted on the roof, where the standard Pierce-Arrow muffler is also placed. The weight of the tractor complete is about 37,000 pounds, and its cost approximately \$16,000.

It will handle six loaded freight cars on the level, and will pull or push two cars on Monument hill, which is a considerable grade. If the tractor continues to prove the success it now is the Pennsylvania company, it is said, will install four or five more.

AUTO EXPORTS INCREASE 95 PER CENT.

Automobile exports for February last showed an increase of 95 per cent. over the exports for the corresponding month of last year. Their aggregate value is stated to be \$4,807,812, as against \$2,461,955. Analysis shows that the gain was due to commercial trucks, of which 1002, valued at \$3,022,482, were shipped abroad as compared with the 57, valued at \$83,461, exported in Febru-

ary, 1914. Exports of passenger cars, while still below corresponding months of 1914 before the outbreak of the European war, are showing an encouraging increase, 2230, with a value of \$1,785,330, being shipped during February, 1915, as against 2837, valued at \$2,378,494, in February, 1914.

MAXWELL SERVICE AT EXPOSITION.

Among the many automobile exhibits at the Panama-Pacific Exposition, San Francisco, Cal., that are attracting the crowds, is the special exhibition held by the Maxwell Motor Company, Inc., Detroit, Mich. A feature of the Maxwell



Viewing the Panama-Pacific Exposition from a 1915 Maxwell Car.

exhibit is the special service it extends to Maxwell dealers and owners, which includes handling all mail for such visitors, providing them with special rest rooms, an information bureau and guides. If it is desired, the company's representatives will make reservations at hotels in advance. In an accompanying illustration is seen a 1915 model Maxwell on a hill overlooking the exposition grounds.

To gather the crude rubber necessary to manufacture the Goodyear Tire & Rubber Company's tires, the work of 97,000 natives is required in the various rubber districts of the world.

Chauffeurs of Toledo, O., have incorporated the Toledo Chauffeurs' Club.

MOTORIZED FIRE FIGHTING APPARATUS.

THE day of the hand and horse drawn fire fighting apparatus is rapidly passing in both the large and small communities of the

provided with hand drawn vehicles, with a modern motor fire fighting unit. An illustration on this page shows the city's equipment, which is a



The Martin Motor Combination Wagon in West Chester, Penn., Showing Its Full Fire Fighting Equipment.

country. The metropolises are all practically motorized, while the small municipalities are finding that motor propelled apparatus is even more valuable in their departments than in the larger cities. As a rule the latter are inadequately equipped, sometimes with hand drawn vehicles and volunteer firemen. Consequently, considerable time, oftentimes sufficient to allow the blazing building or buildings to be entirely destroyed, elapses before the fire fighters arrive with their inadequate apparatus.

West Chester, Penn., suffered severely from fire before the authorities were aroused to equip the local department, which theretofore had been

a special type A combination, built by the Martin Carriage Works, York, Penn. The fire fighting unit consists of two 35-gallon copper chemical tanks, of the Martin quick dumping type; two hand extinguishers; one 20-foot rapid rope hoist extension ladder; one 12-foot roof ladder; and a full equipment of axes, poles, lanterns, bars, etc. A

10-inch swivel dash searchlight is mounted upon the dash. It is stated that this single unit gives excellent service, arriving on the scene of fire in a fraction of the time formerly required by the hand drawn vehicles.

Another accompanying illustration shows the motor fire fighting apparatus which serves Pawtucket, R. I., the first city of the state to adopt such apparatus. With six fire stations, each serving an area of approximately $1\frac{1}{2}$ miles, the Pawtucket department now has nine motor driven machines out of the 11 pieces in use, and affords an excellent example of the economy of maintenance of the motor vehicles over horse drawn

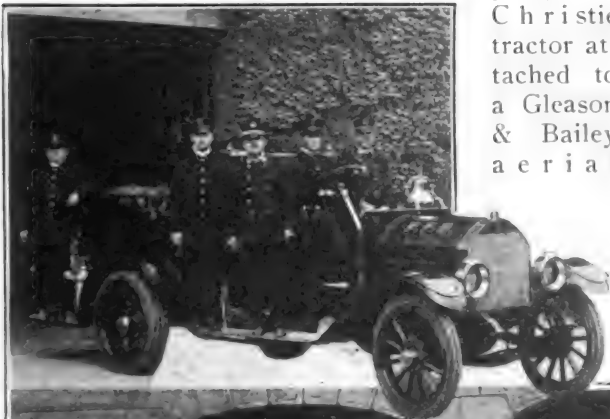


Pawtucket's Motor Fire Apparatus on Review, the Line Being Headed by One of the New Three Boyd Combinations in Which Is the Fire Committee.

fire fighting wagons and engines.

Unlike the majority of communities, Pawtucket did not buy its motor machines outright. The chassis was purchased, but the body and equipment were made at home. By transferring the equipment from the horse drawn wagons to the motorized vehicles, the department was able to hold down the initial cost of each machine to an average of \$3200 each, exclusive of the pump and tractor. Practically every other city has paid from \$4000 to \$6000 for the same kind of apparatus complete. The Pawtucket motor equipment consists of one Webb triple combination

pump, one Christie tractor attached to a Gleason & Bailey aerial



Pawtucket's Motorized Fire Equipment, View Showing the Webb Pump, National "40" and the Latest Boyd Combination Hose and Chemical—In Upper Illustration, Another Boyd Combination.

truck, one National "40," used by the fire chief; three Garford and three Boyd combination hose and chemical machines.

Pawtucket had 11 pieces of horse drawn apparatus and 22 horses in 1910, the last year in which horses were used entirely. During that year it cost a total of \$3617.13 for forage and shoeing. In a recent year the motorized department paid for gasoline, oil, alcohol and grease a total of \$190.95, which shows that it cost 18 times as much to maintain the horse equipment as it does the motor equipment.

As to the comparative depreciation costs of the two types of fire fighting apparatus, it is difficult to make definite statement, for the life of the motor driven fire machine is not known, as none has outlived its usefulness as yet. However, the quick replacement of parts and efficient maintenance practically eliminates depreciation. The oldest piece in the department is stated to be in far better condition today than it was four years ago, at the time of its installation. On the other hand, horse drawn equipment depreciates rapidly, they being made mostly of wood, while the motor vehicles are of steel.

In the matter of tires and wheels, it has been found of course that the expense of the motor vehicle pneumatic or solid cushion tire is greater than the old time iron rimmed wheel. The Pawtucket department has found it necessary to replace on the average of two shoes to each machine every two years.

Aside from monetary considerations, the motorized equipment is far exceeding the horse drawn equipment in the matter of time consumed in getting to and from fires. Valuable time is saved at the very outset of a run. Where it has been necessary to release the horses from their

stalls and harness them to their respective vehicles, with the motor equipment it is simply necessary for the driver to leap to the seat, operate his levers and immediately speed from the fire station. About the only preparation required is to lower the jacks that hold up the wheels so as to save strain upon the tires when the vehicles are not in use. These few seconds gained are frequently the means of saving life and valuable property, which might have been lost if horses were hauling the fire fighting apparatus to the blaze.

INDUSTRIAL HAPPENINGS AND COMMENT.

The J. I. Case T. M. Company, Racine, Wis., is preparing to erect a large warehouse and office building for its factory branch in Madison, Wis., one of the first branches to be established by the company. The new building will be two stories high and will cost approximately \$35,000.

The Houser Publishing Company, Louisville, Ky., is the publisher of the Official Automobile and Motorcycle Directory, Guide and Handbook, which is highly indorsed and used by motorists, chauffeurs, garage, machine and repair shop men, and is constantly referred to in hotels, clubs and libraries. It is an authority in the automobile trade.

The Goodyear Tire and Rubber Company, Akron, O., employed the most noted of Chicago's department store window dressers about a year ago to make up window display designs, which the company sends to its dealers. These are supplied at regular intervals throughout the country, and the service has now become a valuable in-

The Cole Motor Car Company, Indianapolis, Ind., has established an "efficiency hall," where on Thursday nights members of the factory force, of the sales department and of the service department assemble to listen to lectures upon standardization of automobile manufacture and parts. J. F. Richman, factory production manager of the company, delivers the lectures, although plans have been made to have expert representatives of all the standard unit builders whose products are used in the Cole standardized car at future meetings. Mr. Richman states: "Efficiency engineering does not mean cutting down quality. It does mean cutting out wasted steps, wasted motion and making every act a positive and productive effort." President J. J. Cole is a frequent visitor at the lectures.

The Losler Motor Company's former plant at Plattsburg, N. Y., is not to be dismantled, states the company in refutation of the statement that the sale of the surplus machinery to the Chevrolet Motor Company indicated that such was to be the case. Four companies, one of which is to be an automobile concern, will occupy the plant within a short time, according to Theodore Friedeberg, one of the purchasers.

Charles E. Miller, 97-101 Reade street, New York City, has published a new 1915 complete accessory catalogue that is probably the most comprehensive dictionary of the American automobile supply market ever issued. It contains 176 pages and in effect is more of a reference book than a catalogue. It lists, illustrates, describes and quotes prices on thousands of different articles that are in demand or use in connection with motor vehicles. The Miller company requires an edition of 100,000 to supply the demand, the scope of which is world wide. The copies are free and are sent to automobile owners and dealers upon request, either through the 15 branches of the company or the headquarters at New York City.

The New Departure Manufacturing Company, Bristol, Conn., has published one of the most comprehensive non-technical discussions of all bearings and their values that has yet appeared in book form. It is a handsomely prepared booklet of 38 pages, printed on tinted paper and profusely illustrated. The opening chapter treats of the ball bearing

and its development. Another interestingly describes the strength of chrome alloy steel balls, an illustration pointing out that a New Departure ball one inch in diameter can support a weight equivalent to that of a loaded 10-ton truck without being stressed beyond its elastic limit of 45,000 pounds. Among the following chapters, all of which are of vital interest to the car owner, is one that describes the tests New Departure ball bearings must pass before being accepted. The illustration to this chapter describes an optical compressometer by which readings of ball deformations are taken to a limit of accuracy of 125/10,000,000 of an inch.

The National Motor Vehicle Company, Indianapolis, Ind., has issued its new 1915 catalogue, which describes generally and in detailed specifications the full line of National cars, the National roadster, toy tonneau, standard touring car, salon touring car, coupe, cabriolet and the National parlor car. It is printed in two colors, and the illustrations are unusually attractive.

The Hoover Steel Ball Bearing Company, Ann Arbor, Mich., is erecting a new factory building, 250 by 60 feet, to take care of the rapid increase of its business since it started manufacturing little more than two years ago. With the addition the company will employ 230 men, as against 96 in 1913.



Window Display Design Supplied to Dealers by the Goodyear Tire and Rubber Company.

stitution. One of these designs, which includes accessories as well as tires, is shown on this page.

The Hartford Auto Parts Company, Hartford, Conn., has been completely reorganized, the final step being taken by the securing of additional capital and the election of officers. The company is the largest exclusive manufacturer of universal joints and cone clutches in the world. The new officers are C. C. Chamberlain of the Blakeslee Forging Company, Plantsville, Conn., president; James M. Carney, treasurer of the Davidson & Watts Manufacturing Company, Hartford, vice president; Edward D. Redfield, formerly of the City Bank, Hartford, treasurer; Harry W. Bigelow, secretary and assistant treasurer, who will also act as manager of the plant. The board of directors, in addition to the men mentioned above, includes John H. Trumbull of the Trumbull Electric Company, and Horace H. Ensworth.

The Continental Motor Manufacturing Company, Detroit and Muskegon, Mich., is distributing its new 12-page booklet, entitled "Motors Plus Individuality." It is an attractive publication, both in its appearance and its contents. The first part of the booklet is devoted to a legendary tale of one Scario, hunchback and master sword maker, the moral of the tale being applied to the manufacture of Continental motors.

BRISCOE BAND AT INDIANAPOLIS.

The Briscoe band, composed of employees of the Briscoe Motor Car Company, Jackson, Mich., will attend the Indianapolis speedway races, May 29, at the expense of President Briscoe, and is expected to enliven the occasion with a musical programme. The trip is to be in the nature of an outing, but the employees will not suffer a reduction from the wages for the time lost.

CALIFORNIA'S VEHICLE EXHIBIT.

The world's greatest exhibition of vehicles used for transportation purposes, either on land or in the sky, is housed within the spacious walls of the Transportation building at the Panama-Pacific Exposition at San Francisco. The types range from the modern farm wagon to the two-wheel commissary type of cart now being used by the warring nations of Europe. The central point of attraction, however, is said to be the automobile department, covering one floor and stated to be the largest ever held. It is estimated that fully 2,000,000 people have visited the automobile exhibit.

The accompanying illustration shows the exhibit of Mitchell cars, built by the Mitchell-Lewis Motor Company, Racine, Wis., and in charge of the San Francisco distributors, the Osen-McFarland Auto Company. The latter states that a good volume of business has been transacted, with certain prospects of an increase as the summer months approach.

RESULTS OF LIGHT CAR TEST.

In the "Dollars and Cents" light car reliability run from Newark, N. J., to Philadelphia and return April 18, five cars were given perfect scores under the rules of Light Car Association of America, which sanctioned the contest. Silver cups were given to the following winners of 175-mile run, which was covered in nine hours: P. G. Scull, Newark, in a Trumbull; C. Miller, East Orange, in a Scripps-Booth; Frank Haag, Jr., Newark, in a Saxon; Ollie Squires, Paterson, in a Vixen; T. Preston Ward, New York City, in

an Argo, and C. Reading Gulich, Newark, in the second Trumbull. The two drivers of Trumbulls also won the silver economy cups. The first winner carried two passengers the entire distance at a total cost of 67½ cents for the 175 miles, his gasoline mileage being 35 miles to a gallon. The next winner carried two passengers at a total cost of 73 cents. The cost was based on the prevailing cost of fuel and oil at the local market that day, and the cars averaged 20 miles an hour for the 175 miles.

FORTY APPLY FOR PREMIER TOUR.

Present indications point to the Premier tour, which will leave Chicago, Aug. 7, for the California expositions, being the biggest event of its



Partial View of the Automobile Exhibition at the Panama-Pacific Exposition, Showing the Mitchell Cars.

kind in the history of overland touring. Harry Newman of the Western States Automobile Company, Chicago, Ill., distributor of Premier cars, states that he has received 40 applications from motor car owners in Chicago alone who have expressed a desire to make the trip. Much interest is manifested by other owners throughout the country, and Miss Grace C. Strachan, president of the Interborough Association of Women Teachers, Brooklyn, N. Y., is the first woman to file application, entering a Lozier car. As a further promotion, the organizers of the tour are arranging "feed" tours, the Premier dealers in various localities planning to make up local parties and furnish them pilots to the Chicago gathering place to join the main body of tourists.

PREPARING FOR THE INDIANAPOLIS RACE.

THE master drivers of the automobile racing world are preparing themselves and their cars for the next Indianapolis motor meet, May 29. Among the drivers already entered as contestants are several whom are well known in foreign countries. The meet promises to be the premier event of the season.



Gil Anderson, Dean of Stutz Team.

Chief among the foreign entrants is Dario Resta, who will drive a Peugeot, the same make of car with which he won the Grand Prize and Vanderbilt Cup races at San Francisco. The second Peugeot will be piloted by Bob Burman, while the driver of the third has not yet been announced, though it is rumored that Arthur Duray, runner up in the Indianapolis race of last year, is the probable entrant. Two other foreign candidates for honors are J. Porporato and possibly Jean Chassagne, both of whom probably will drive English Sunbeam cars. Porporato is said to be tuning up his car on the Brooklands track at this time, preparatory to sailing for the United States.

Two Americans who are expected to give the foreign drivers a terrific battle for the honors and the chief prize of the \$50,000 offered, are Barney Oldfield and Ralph de Palma. Oldfield has abandoned his Maxwell for this race, he being engaged to drive a Bugatti for Charles Fuller, a wealthy New York City sportsman. The car is said to have been built especially for this race, having been imported early this year.

A peculiar feature will be that the two brothers, Ralph and John de Palma, will compete. John de Palma served his apprenticeship as mechanic for his more famous brother all last season. This year he will drive the Delage car that won the last Indianapolis speedway contest, he now being at the motordrome with his brother, who is assisting in rebuilding the car to

conform to the racing requirements at this track.

Considerable mystery has surrounded the car that Eddie Pullen is expected to pilot over the 500-mile course. It was stated that a new racing car, the like of which the world has never seen, was under construction by the Mercer Company, Trenton, N. J. Unofficial reports state that the machine will possess a motor that turns 3900 revolutions a minute without a drop in power curve.

For a while it was thought that the Stutz company would not have representation in the event, but it has been announced that the company and the racing officials have come to an understanding and three Stutz cars have been entered. Though no names were mentioned in the entry blank, it is well understood that the veteran Stutz racing team, consisting of Gil Anderson, Earl Cooper and Howard Wilcox, will pilot the cars. Features of the Stutz cars are that they will all be absolutely new and will have several of the designs of foreign racing cars, including 16 overhead valves.

The F. R. P. team will be composed of Hughie Hughes, Neil Whalen and Bruce Keene. Ray Harroun, winner of the 1911 Indianapolis race, has already taken up his permanent quarters at the motordrome, and has made arrangements, it is said, for seven Maxwell cars. Another arrival at the speedway is Eddie Rickenbacher, who is tuning up a new Maxwell. It is rumored that Rickenbacher, who is a acknowledged to be a "speed demon," will be the pace breaker for the Maxwell team.



John De Palma, New Racing Driver.

Much interest will centre in the "made in America" car that Ralph Mulford, America's 1910 road champion, is building himself and is expected to drive at Indianapolis.

Mulford is said to have declared that his car will show that an American made racing car is as good, if not better, than any foreign made, and

he hopes to prove his statement.

Though a millionaire brewer, Erwin Bergdoll is also a racing enthusiast and is having built three special cars, it is stated, which he is expected to enter in the 500-mile Hoosier classic, driving one him-

grounds and a large corps of workmen is endeavoring to finish the speedway before the contracted date of Aug. 1.

Under the present plans, the grandstands will accommodate at least 75,000 spectators, and with the special boxes and other reservations another 75,000 can be accommodated. The course is to be equal to most modern of speedways. The curves are to be so constructed as to allow the drivers to drive around them at top speed, as though they were on the straightaway. Labor Day, when the track will be inaugurated with a 500-mile race, is expected to be a notable day in the racing world.

PLAN RACE AT BRIGHTON.

An automobile race at Brighton Beach, N. Y., will be held June 12, if the application made to the American Automobile Association is sanctioned. An afternoon and night programme is proposed.

DRIVERS' SHARES IN PACIFIC RACES.

The winter's racing competitions along the Pacific coast circuit netted \$45,800 for the fortunate drivers in the six contests held in five different coast cities. Barney Oldfield, star of the Maxwell team, won the largest total, \$7000, of which \$2500 was paid for his non-stop, record-breaking run at Corona; \$3500 for winning the Venice Grand Prix, and \$1000 for his victory in the Borderland Fair event at Tucson. Second to Oldfield was Dario Resta, whose total was \$6000, and third was Billy Carlson, with a total of \$5800. Next comes Eddie Pullen, with \$5500; Cooper with \$5000; Wilcox, \$4000; Ruckstell, \$2250; De Palma, \$2000; O'Donnell, Hughes and Alley, \$1500 each; Marquis and Anderson, each, \$1000.



Howard Wilcox, Possible Winner.

self. Bergdoll won distinction in 1911 by piloting a Benz to victory in the Fairmount park race in Philadelphia as an amateur.

It is expected that when the master drivers assemble for the contest on May 29, there will be at least 33 entries facing the starter, instead of 30 as of last year. The Indianapolis race has always attracted a great assemblage, numbering approximately 100,000 spectators. The first race was in 1909, the year in which the track was completed, but until 1911 the races were classed among the minor events. In that year the first 500-mile event was run, prizes amounting to \$25,000 being offered. In the next year the amount was increased to \$50,000, which has been the standard since that time. Including this year's prize money, the Indianapolis motor speedway will have distributed more than \$250,000 in purses to racing drivers.

DETROIT MOTORDROME BEGUN.

What uncertainty existed about the Detroit race set for Labor Day has disappeared upon the announcement that work upon the speedway course has begun and is progressing satisfactorily. The former controlling organization, the Detroit Speedway Club, has been reorganized, practically all the former officers and promoters having been eliminated. It is stated that capitalists of Indianapolis are now interested in the project. The necessary machinery is now at the



Earl Cooper, Stutz Driver.

RAPID UNLOADING WHITE TRUCKS.

To facilitate the quick discharging of coal, etc., into chutes, basement windows, manholes and similar apertures in congested districts, the White Company, Cleveland, O., has designed a hopper-bottom, gravity-discharging elevated body for use on its 3000-pound chassis. The design is said to be one of the first successful applications of the power hoist to the fast moving medium duty truck. Statement is made that the body can be elevated to a height sufficient for quick discharge by gravity in 30 seconds.

The body is of steel construction, with a capacity of 72 cubic feet, and is elevated by worm operated lever arms, the worm being driven by sprockets and chains from a longitudinal shaft that is driven from the power transmission gear-set of the truck. The lever arms are mounted in two pairs, one to each end, and attached to trans-



View Showing How White Hopper-Bottom Truck Body Is Elevated, and Its Discharge Chute Is Located.

verse shafts that are turned by worms and gears. The body is held stable while being elevated or lowered by four standards which move vertically through guides mounted upon and braced from the truck frame. Volume of discharge is regulated by the bottom gate at the head of the chute extended from the hopper base to the manhole, which is shown in the accompanying illustration.

TRUCK TIRE FIGURES.

C. W. Martin, manager of the truck department of the Goodyear Tire and Rubber Company, Akron, O., points out that there are large profits in the handling of truck tires, which, he states, have "arrived". He estimates that a truck uses an average of \$175 worth of tires a year. "Up to a year ago", he states, "truck tires

were regarded by the average dealer as a necessary evil, something that concerned him very remotely. The situation has changed. In small towns, in the past, truck users have had to buy tires out of town. This meant delays. By buying his tires at home the truck owner gets service, eliminates costly delays and patronizes home industry. We, as manufacturers, benefit because we no longer need to be retailers, in competition with legitimate dealers everywhere.

OVERLAND'S ELECTRIC BAKING OVENS.

The Willys-Overland Company, Toledo, O., has adopted electricity to operate its 16 large baking ovens, which were formerly heated by gas. It marks another step toward intensive efficiency by America's second largest automobile manufacturer. Together the ovens have a volume of 48,000 cubic feet and a capacity of 140 tons of enamelled product, the work consisting of various sized and shaped steel parts. This addition increases the total horsepower used by the company to approximately 10,000 horsepower load, which is equivalent to that required to light a city of 225,000 inhabitants. The ovens are almost automatic, the closing of the doors automatically throwing switches which turn on the current. A pyrometer which can be adjusted to any desired temperature rings a bell when the proper degree of heat is reached and simultaneously turns off the current. It is stated that the new installation increases the volume of work 50 per cent. over the old methods, and minimizes the possibility of industrial accidents. Fire danger is entirely eliminated, and the danger from explosions is done away with.

PAIGE CAR FOR TRACTION COMPANY.

The Paige-Detroit Motor Car Company, Detroit, Mich., has sold through its Syracuse (New York) agents, the Seneca Motor Car Company, to the Rochester Railway and Light Company nine Paige cars, one of which is a Paige "Six-46" and the others Glenwood Fours. The cars will be used by the traction company in its varied lines of business, and were selected after a long and rigid series of tests in which many cars of standard make were tried.

Automobile registrations in the State of Illinois during 1914 amounted to 131,140 in number.

SUGGESTIONS FOR THE FORD CAR OWNER.

The Relations of the Pistons to Each Other in a Four-Cylinder Motor and the Operation of the Valves During the Different Strokes of the Cycle.

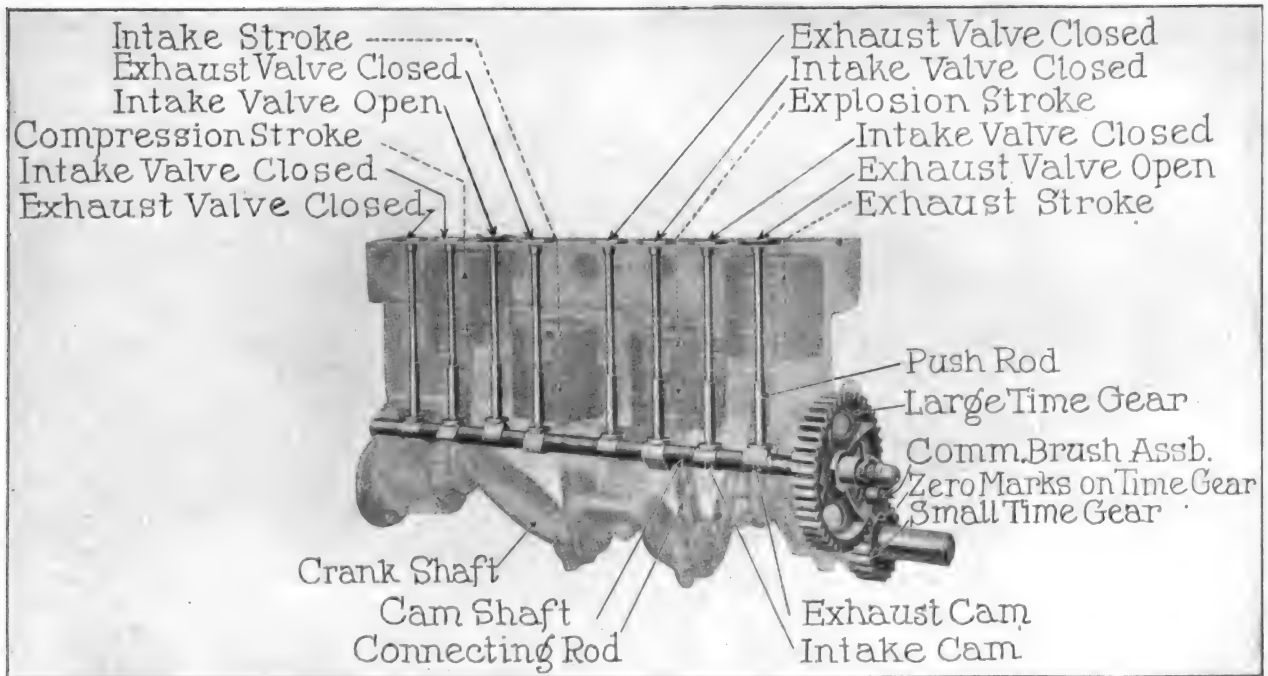
The 22nd article dealing with the construction, operation, maintenance, care and repair of model T Ford chassis deals with the theory of gasoline engines with reference to the relations of the pistons and valves—facts which every operator of machines should have full knowledge of to successfully drive and maintain his automobile.

POWER impulses in any motor must take place at a precise point with reference to the position of the pistons in the cylinders, and were the engine to have a constant speed the firing point could be fixed, but as the fuel cannot well be regulated the variations are obtained by causing the explosions to take place at different times. The engine must make the two full

valves and their relation to the pistons.

Each cylinder has two valves, one of which is seated in the port that admits the fuel from the carburetor through the intake manifold, and the other that seats in the port that opens into the exhaust manifold. The intake valves must be opened so that the cylinder will obtain a charge of fresh gas during the intake or suction stroke, and it remains closed during the other three strokes of the piston. The exhaust valve must be opened during the exhaust stroke, and closed the other three strokes of the cycle.

Considering the action of the valves with rela-



Cylinder Assembly Without the Head Showing the Correct Position of the Valves with the Timing Gears Correctly Set, and the Relative Positions of the Pistons in Their Strokes as Indicated.

strokes of the piston in either direction to complete the cycle, but these cannot be varied.

By this is meant that the piston must always maintain its relation to the opening and closing of the valves, for these cannot be changed, and the fuel is supplied as is required by the valve operation, but by firing the gas in the cylinder the speed of the engine is driven either fast or slow as is necessary. This fact necessitates a clear understanding of the operation of the

tion to the strokes of the cycle one will note that the initial stroke is that which draws the fuel into the cylinder, and during this stroke the intake valve is open and the exhaust valve closed. Both valves are closed during the compression and the expansion strokes, and during the exhaust stroke the exhaust valve is open and the intake valve closed. Or, to put it another way, the exhaust valve closing is directly followed by the opening of the intake valve, and there is a

valve in action during one of the two revolutions of the crankshaft that make a cycle.

Each cylinder of an engine must have the valve action that will obtain the greatest efficiency—this being an important factor with the designing engineer—and each cylinder must be in precise relation to each other that the motor shall be balanced and the expansion forces of the explosions exerted so that they will be most productive of power. Examination of the accompanying illustration will indicate the relations of each valve, cam and piston at a given position in the cylinders of the Ford motor, and, of course, this relation to each other is maintained during the entire cycle.

Position of the Valves and Pistons.

The illustration of the Ford engine merely shows a part of the assembly, the cylinder block head being removed for the purpose of showing the pistons and the crankcase being shown in phantom to the better represent the action of the camshaft and the position of the cams with reference to the valves. This illustration can be studied with much profit, for it shows the correct positions of the valves when the timing gears are set according to the marks placed on them to insure that the gears shall be correctly meshed if there should be any reason for disassembling them.

Statement has been made that internal explosion engines are single-acting—that is, there is a power impulse in but one direction—but the reader has undoubtedly realized that with any given cylinder a greater number of impulses cannot be obtained. For this reason and to obtain an explosion stroke oftener than once in two revolutions of the crankshaft the number of cylinders is increased. Thus, with the two-cylinder motor there is a power stroke during a half of each revolution, and with four cylinders there are two power strokes each revolution, so that this type of engine has the fewest cylinders that will afford a continuity of impulses upon the crankshaft instead of intermittent impulses.

Function of the Flywheel.

The purpose of the flywheel is to balance the engine. By balance is meant a sufficient load so that when the crankshaft is turned it will continue turning after the power impulse has ceased and until another power stroke has been given. Obviously if but one power stroke were given the engine would have but little momentum, and as the power strokes succeed each other the wheel is kept turning and energy is stored in the flywheel in proportion to its weight and speed. For a single-cylinder motor the flywheel must

be larger than for one of two cylinders, and as the cylinders are multiplied the weight of the flywheel can be correspondingly reduced until what may be termed an engineering minimum has been reached.

This, of course, applies to a motor that is operated idle, or without a useful load, but when an engine is coupled through the driving system to the road wheels of a vehicle the momentum of the vehicle has its influence. A motor operated idle should never be driven rapidly, because high speed without a load means extreme vibration and quick wearing of the bearings.

Power Required to Start.

The starting of a motor requires more power than is really necessary to keep it turning, and starting a power vehicle requires greater effort than is necessary to continue movement, but after momentum has been acquired there are other factors to be considered, such as road surface, gradients and wind resistance, all of which have varying influence and necessitate power consumption that might otherwise be usefully applied. When a power vehicle is standing motionless it is at what is known as anchorage, and if the power is exerted with full force the result would be destructive, although this force could be exerted if it were in motion to decided advantage.

These statements are made that there will be clear realization of facts that are to be dealt with later on in these articles, and which will have material bearing on the operation of an engine and of a motor vehicle.

Reverting to the operation of the engine cylinders and the relation of the valves to the power strokes: Statement has been made that the intake valve is open during the suction stroke and that the exhaust valve is open during the exhaust stroke, both of which are in a general sense true, but the precise time of opening and closing these valves has decidedly important bearing on the operation of the motor.

Cylinder Divided Into Two Parts.

In engineering nomenclature the cylinder is divided into two parts. The piston when it is at the top of the upward stroke does not reach the cylinder head. That portion of the cylinder in which the piston moves is known as the expansion chamber, and that portion between the head of the piston and the top of the cylinder is the combustion chamber or head. The piston displaces a specific volume and the combustion chamber, which includes the valve pockets, will have a capacity of from 20 to 30 per cent. of the displacement of the piston. The combustion

chamber of small capacity will be for the high compression motor, and that of large capacity for the low compression engine. Generally speaking the ratio of the combustion chamber to the piston displacement will be from 23 to 27 per cent., and for practical purposes an average of 25 per cent. can be assumed.

Ratios of Combustion Chambers.

Taking a combustion chamber of 25 per cent. of the piston displacement and adding this to the displacement, when the piston is at the bottom of the cylinder the combined chambers may be regarded as 100 per cent. When the piston is at the top of the cylinder it has displaced 80 per cent. of the contents of the cylinder, so that the atmospheric or gaseous content of the cylinder has been compressed to 20 per cent. of its original volume, which would mean approximately four atmospheres or four times 14.8 pounds, or 59.2 pounds pressure. From this statement the reader will understand that if there shall be no leakage of compression a fuel gas drawn into a cylinder of the proportions stated would be compressed to about 59 pounds pressure. The pressure will vary according to the proportions of the combustion chamber, and the higher the pressure the greater the expansive force when the gas is ignited, but there are maximums and minimums of pressure favored by designers, which are applied to different motors, and no rule can be applied.

High and Low Compression.

The theory of engineers is that the lower the compression the less will be the stresses from the explosion of the gas upon the piston heads, while the higher the compression the greater will be these stresses and the life and endurance of the motor will be reduced unless provision has been made in the design to resist these by heavier construction. The motors of racing machines are of higher compression than those intended for ordinary service, because the greater explosive force means more power from the consumption of a given volume of fuel, but where economy of maintenance and reduced upkeep is sought the compression is much lower than in faster vehicles. Many automobile engines are in use in which the compression will not much exceed 40 pounds, while there are others that will have 75 pounds pressure. In rare instances this has been exceeded, and engines have been constructed with compression of 90 pounds, but few engineers would consider this apparent extreme.

The movement of the piston that has exhausted an engine cylinder displaces approximately 80 per cent. of the content of the combined combus-

Mossberg Guaranteed SMALL CAR TOOLS



No. 30
Socket
Wrench
Set
\$4.00
Complete



An ideal
set for
light car
users
\$2.00

Small Car Socket Wrench Set No. 17
Ford Reverse and Brake
Pedal Wrenches



12c
Single End

S. E. Reverse Brake and Cylinder Head Wrench No. 640
Ratchet Reverse Wrench



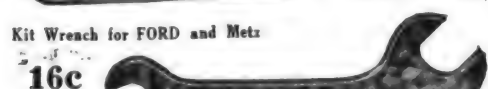
50c
Best
Adapted

Ratchet Reverse Brake Pedal and Tension Spring
Wrench No. 648, No. 1464.

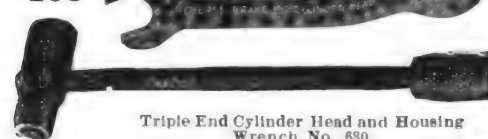


The "Old Necessary"
10c

Ford Hub Cap
Wrench No. 650



Kit Wrench for FORD and Metz
16c

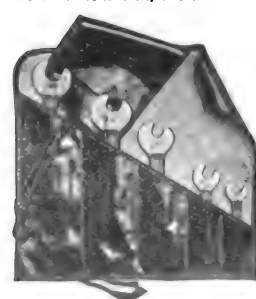


Triple End Cylinder Head and Housing
Wrench No. 630

Almost indispensable on cylinder head and Axle
Housing Nuts because the sockets are tapered 26c



Valve Grinder
for Ford
The Logical Valve
Grinder 25c



FORD
Engineer's Set \$1.00

FRANK MOSSBERG CO.
ATTLEBORO, MASS.

If your dealer cannot supply you, we will ship prepaid on receipt of price. Send for Catalogue No. 171 E.

tion and expansion chambers, and when the movement of the piston has begun for the suction stroke a partial vacuum is created in the cylinder which, when the intake valve has been opened, draws the fuel gas into the cylinder until it is filled. Then the intake valve is closed and the compression stroke compresses the fuel into the combustion chamber or head of the cylinder. Compression creates heat and ignition from compression is possible, but this would not be practical in a motor used for automobile propulsion.

Position of Pistons in Cylinders.

The reader will observe that the accompanying illustration of a Ford motor shows the piston heads above the top of the cylinder block. This means that the combustion chamber and a small part of the expansion chamber of the Ford motor is in the engine head. This is a detail of construction that is peculiar to the Ford design and is not true of all motors.

The theory of carburetion will be considered in sequence with carburetors, but at this point the reader should understand that gasoline itself is not burned in a motor. The fluid is atomized or so volatized that it becomes a gas, and this gas with varying proportions of air is intensely inflammable. As this gas is burned in a cylinder it expands, and this expansion forces the piston downward in the cylinder. The expansive force of burning gas will vary with the compression, the proportions of air and gasoline vapor composing the fuel, and the intensity of the spark causing ignition.

Proportions of Fuel Gas.

Gasoline vapor and air can be consumed in proportions varying from one part of vapor to 19 parts of air to one part of vapor and five parts of air. The smaller the proportion of gasoline vapor the quicker the combustion and as the ratio of gasoline vapor is increased the slower the fuel will consume, until a point is reached where the proportion of gasoline is so great that it cannot be ignited. When fuel is ignited in the combustion chamber of an explosion engine the initial pressure will range from 240 to 360 pounds, and in some instances this will be exceeded. Speaking broadly, 275 pounds will be the average. The explosion of the gas to be most efficient should be instantaneous, and this causes a violent blow on the piston head, which forces it downward in the cylinder. As the valves are closed the pressure is decreased as the piston moves downward, and it is diminished in the same ratio as the compression of the gas is accomplished. That is, the pressure is reduced to approximately a fifth of the initial expansion pres-

sure, when the piston has reached the bottom of the stroke.

Expansion Pressure Reduced.

As a matter of fact this pressure is even more reduced, for usually the exhaust valve is opened before the piston has reached the bottom of the cylinder, the reason being that the pressure caused by the explosion shall be so diminished that there shall be no resistance upon the piston when it begins to move upward on the exhaust stroke. In the Ford motor the bore of the cylinder is $3\frac{3}{4}$ inches and the stroke is four inches, and when the piston has reached a point $\frac{5}{16}$ inch from the bottom of the expansion stroke the exhaust valve begins to open, and it remains open during the remainder of the expansion stroke and during all of the exhaust stroke, closing when the piston is exactly at the top of the cylinder and has fully completed the exhaust stroke.

For a very brief interval the two valves are closed, and then when the piston has moved downward $\frac{1}{16}$ of an inch of the suction stroke the intake valve is opened and it remains open during all of the suction stroke and until the piston has moved upward $\frac{9}{16}$ inch of the compression stroke. Then both valves will continue closed during the remainder of the compression stroke and until the piston has again reached a point $\frac{5}{16}$ from the bottom of the cylinder during the expansion stroke.

Positions in Ford Motors.

These positions are absolutely correct with reference to the Ford motor, but they will not apply to any other engine. The valves of each cylinder operate alike and so it is evident that when the valves of No. 1, or the first cylinder as seen from the front of the motor, are correctly set that all of the other valves will be precisely timed. There is no reason to vary from the timing data that has been given unless for some reason that will later be considered.

The consideration of the valves has been believed advisable in connection with the theory of the motor because of the importance of the valve action to the power production and the efficiency of the engine.

Function of the Camshaft.

The valves are operated by a shaft that parallels the crankshaft which is driven by a gear that meshes with a gear on the crankshaft, and which carries a series of eight cams, each of which is so placed that it will lift the valve at the precise point desired to obtain the highest engine efficiency. This camshaft is set so that there can be no variance until the cams become worn,

which will naturally affect the operation of the motor.

The reader will understand that the relations of the valves to the cylinders and pistons cannot be changed, and that the fuel must be drawn into the cylinders at arbitrary points, but there can be variations as to the quality of the fuel supplied and of the point in the stroke when the fuel in the cylinders can be ignited. These factors will be considered later on.

Heat Caused by Combustion.

The burning of the gas in the cylinders will create intense heat. As a matter of fact not more than 20 per cent. of the heat that is created is used in power production, for approximately 53 per cent. is lost in cooling the motor and about 29 per cent. is dissipated through the exhaust, the remainder being available for driving the engine. These figures appear extreme, but they are dependable as an average, although there will be some variation with different designs. The consumption of the fuel takes place in the cylinders with extreme rapidity. Assuming 1500 revolutions a minute there will be 750 explosions a minute in each cylinder, and motors have been driven to considerably in excess of 3000 revolutions. The Ford motor is what may be characterized as a medium speed engine, and 1500 revolutions is probably as fast as it will ever be driven in normal operation.

The quick burning of the gas in the cylinders causes great heat. The temperature of the flame in the combustion chamber will vary from 2000 to 2500 degrees Fahrenheit, and the cylinder walls will be heated to perhaps 600 degrees, but because of a circulation of water in the jackets of the engine the exterior of the motor will be kept approximately to the temperature of the water. The water fills the water jackets and the radiator, and the large radiating surface of the latter is usually adequate to cool the engine sufficiently without boiling the water in the cooling system. In theory the water ought to be maintained as near the boiling point as is possible, for this will give the power obtaining from the highest degree of heat. The only result from boiling the water in a cooling system that is normally operative is the necessity of replenishing the water to maintain the full volume. Such boiling may result from operation at extreme speed for a considerable period, but in many instances it is indication of trouble that ought to receive attention if the efficiency of the motor is to be maintained.

(To Be Continued.)

HOME-MADE FORD OILER.

An emergency oiler for Ford cars was recently made by a reader who is desirous that other Ford owners shall share in the benefit of his experience. A tank containing about four gallons of lubricating oil was placed under the rear seat and a pipe line run from it to a glass barrelled oil pump which was securely fastened to the dash. The tubing was fitted with a stop cock at the point where it entered the pump. A second pipe line was then run from the pump to the crankcase. Of course a small hole was drilled in the crankcase cover and tapped for the small pipe that was fitted. With the pump any volume of oil can be forced direct from the tank into the crankcase.

To replenish the oil the stop cock on the intake pipe line leading to the oil tank is opened and the pump plunger pulled up. This will draw the oil into the pump. The stop cock is then closed and the plunger pushed down, thus forc-

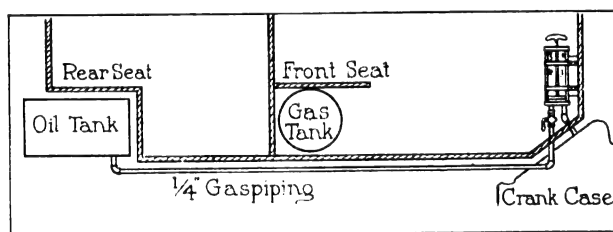


Diagram of an Auxiliary Oiling System Adopted for a Ford Car That Gives Very Practical Results.

ing the oil into the crankcase. The writer suggests that a glass barrelled pump be used, as the oil can be seen when drawn into the pump. This auxiliary system is especially useful when making long tours, as the operator does not have to stop the car or leave the seat when it becomes necessary to add to the oil supply. Another advantage of this system is that a sufficient quantity of oil will always be carried on the car, thus obviating the possibility of a shortage of lubricant while on the road. If the motor is not well lubricated it will rapidly heat and if operation is continued without lubrication much damage may be done. Scored cylinders, burned bearings, broken piston rings, etc., are some of the results of insufficient lubrication.

The Studebaker Corporation, Detroit, Mich., sold more commercial cars during the first three weeks of March than during the first nine months of 1914. During the first week 51 commercial cars were sold.

MODEL T FORD CONVERTED TO A RACYTYPE.

CONVERSION of model T Ford chassis is frequently undertaken by those who desire something that is not afforded by the usual chassis and body equipment, and a very interesting example of what is possible is a machine that is owned by R. G. Marr of 669 North Main street, Providence, R. I., who has constructed a machine that he intends to drive in racing events, although he is now using it for publicity purposes because of the attention it attracts when driven through the cities and towns of southern New England.

The chassis was a standard model T Ford construction, which has been rebuilt to obtain certain driving qualities and additional power.



Ford Chassis Converted Into a Racytype by Reconstruction of the Body, Hood and Numerous Changes of the Suspension and Equipment.

The wheelbase has been lengthened to 103 inches, this being necessary to lower the frame, the clearance being made $4\frac{1}{2}$ inches. The forward spring has been removed from the front axle and installed on two brackets that are placed under the axle, and extend back, this dropping the frame six inches. The rear end of the chassis frame is carried on a yoke that is clamped to the top of the arch of the rear spring, and this brings the frame inside of the rear axle. The brackets and fittings for this change and, in fact, all of the other special work, was designed by Mr. Marr.

The motor cylinder block has been rebored and the cylinders now have bores of $3\frac{25}{32}$ inches, this somewhat increasing the capacity of each. These have been fitted with Zephyr pressed steel pistons, which weigh 24 ounces each, as against 56 ounces for the regular Ford piston, and these were imported from

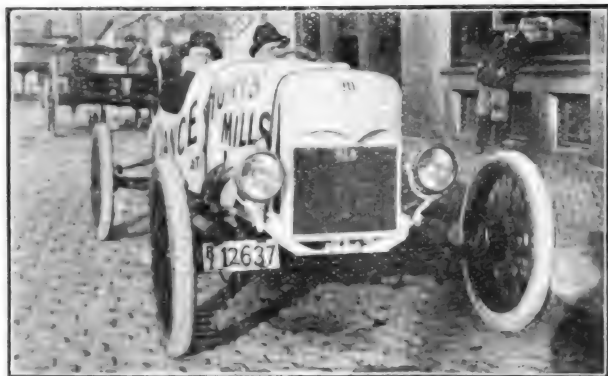
England, the cylinders being rebored to fit the pistons. The compression is considerably increased and the larger displacement has made practical the production of more power. The lighter pistons also permit faster engine speeds.

The engine has been fitted with a Bosch high-tension magneto for ignition, this including the regular Bosch system which is driven by gears from the timing gearset. A Stromberg carburetor has been added, and the lubrication is made positive by the installation of a Danver's oiler, which will circulate a gallon of oil a minute. The radiator has been enlarged by the building of a header or auxiliary tank that is above the cellular core, and this has a capacity of two gallons more than the regular Ford equipment. The appearance of the radiator is distinctive and not unsightly, and the system is now such that the engine will not overheat, no matter how hard or how long it is driven. The increased height of the radiator necessitated a change in the water connections, but there is always considerable water above the opening of the water outlet connection into the radiator. The radiator gives a distinctly foreign appearance to the machine, and a very deep hood was necessary, which is strapped to the chassis frame. The regular exhaust pipe

has been discarded and two flexible tubes have been carried from the exhaust manifold to a torpedo-shaped muffler that is mounted on the side of the chassis frame outside the hood, which insures thorough cooling. This silencer is slightly enough and the hood is cut so that it will drop below the exhaust pipes and thoroughly protect the motor. The position of the muffler can be seen in the accompanying illustration.

The operating pedals of the machine have been changed so as to make for easy operation. For when the frame was lowered the pedals were somewhat awkward for the driver to operate conveniently, and the steering column has been placed at an entirely different angle, for there is no seat and the driver sits on cushions placed on the deck of the chassis. The power transmission system has been also changed by the installation of a new pinion for the driving shaft and

a new master gear for the differential assembly, the ratio of these gears now being $2\frac{1}{2}:1$, so that the car can be driven to approximately 75 miles



The Ford Racytype Head-On, Showing the Underslung Frame and the Greatly Increased Radiator.

an hour, and perhaps this speed may be exceeded on a track.

Some Minor Changes.

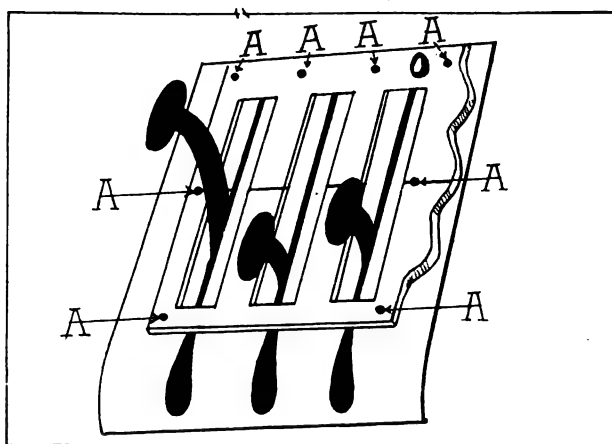
The gasoline is supplied from a tank bolted to the chassis frame back of the body, and a large hand pump affords the pressure that is necessary to insure a full head of fuel at the carburetor. The Ford wheels have been replaced with a set of Houk wire wheels, and a spare wheel is carried at the rear on a bracket, this being fitted with an inflated tire so that changing may be quickly done. The body is a bucket design, with a deep cowl that extends back from the hood, there being no dash visible. The sides are sufficiently high to protect the occupants from wind and these are carried around so that they form a low back for the seat, and within the body compartment a back rest is placed at an angle, the space between this and the rear of the body forming a tool box that is unusually spacious.

The body is extremely light and with the regular spring that is at the rear the machine rides stiff when driven at ordinary speeds, but when moving fast the car is unusually steady and is remarkably comfortable to ride in. The car as it is now equipped has unusual power and can be driven an average of 30 miles to the gallon of fuel. There is but one condition that can be criticised when the use of the machine is solely for comfort or pleasure, and that is the low position of the starting crank, which makes cranking awkward and inconvenient. The machine is generally started by pushing it, this obviating cranking and all attending discomforts. Mr. Marr built the machine with the intention of racing it, and he says that it has more than met his expectations.

KEEPING THE CAR COOL.

Suggestion is made by a reader of a method which he has found practical for preventing the heat of the engine of a Ford car from reaching the driver through the pedal slots. The heat may be desirable in winter temperatures, but it is very unpleasant during the warmer months of the year. To obviate the annoyance of the body being heated from the motor many cars are fitted with ventilators on the dash or in the body, which admit cool air into the front compartment. As Ford cars are not ventilated the following advice will no doubt be found useful.

Remove the floor board, and to the under side of it at the points "A," as shown in the accompanying sketch, fasten a piece of pantasote or leather about 12 inches wide and 14 inches length. Next cut three slots so as to allow the pedals to work free. Pass the apron over the pedals and replace the floor board. The bottom of the apron should then be allowed to hang down over the crankcase. When cutting the slots for the pedals it will only be necessary to



Apron Devised to Prevent Heat Entering a Ford Car Body Through the Pedal Slots.

make one perpendicular cut for each pedal, as it is essential that these slots shall be as close as possible. If the operation is carefully done, the pedals will not stick and the heat from the engine will be diverted beneath the floor of the car.

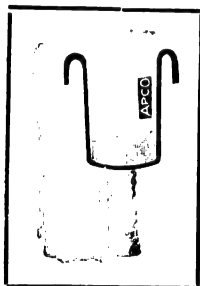
The Ford Dealer is the name of the house organ being published by the Auto Parts Company, Providence, R. I., manufacturer of the Apco line of specialties. It is published on the 20th of each month and its contents is devoted to the interests of the Ford dealer and garage. It contains many interesting items. Copies will be mailed free to the trade upon request.

FORD CAR ACCESSORIES AND EQUIPMENT.

APCO VALVE STEM PACKING.

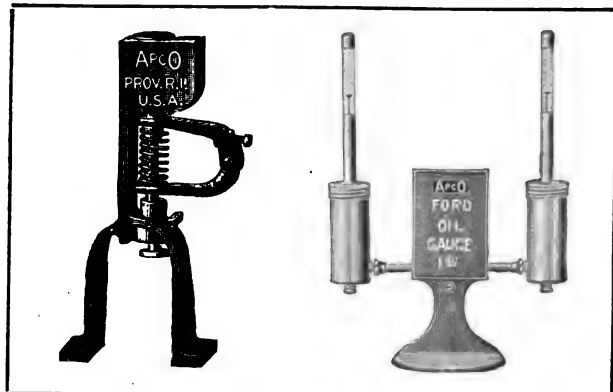
Providence Apco Specialties Company Offers Valve Packing and Display Stands for Its Products.

The Auto Parts Company, Providence, R. I., manufacturer of the well known line of Apco specialties for Ford cars, is producing a device that prevents the entrance of air between the valve stem and guide when these members become worn. It is an established fact that an extra supply of air will weaken the fuel mixture and decrease the power of the motor. This is very noticeable at low throttle, when a rich mixture is necessary for the smooth running of the engine. When the mixture becomes weak the motor will miss, and at low throttle the motor may stop entirely.



Valve Stem Packing.

The Apco valve stem packing consists of a special steel stamping which carries a felt washer. The device is held against the bottom of the valve guide and around the valve stem by the valve spring, as shown in the accompanying illustration. The maker states that the felt washer is well oiled and will therefore keep the valve stem and guide well lubricated. Another advantage which the maker points out is that the device will prevent the entrance of dust and other abrasive elements into the guide, which causes the valve to stick. The packings are arranged in sets of eight,



Apco Display Stands Showing Valve Remover and Oil Gauge.

and are sold for 50 cents per set. Four of these packings should be used for the exhaust guides to overcome the hissing noise of hot gases. These packings are just as necessary on new cars as they are on old cars; they prevent wear on the valve stem and guide and therefore insure a good mixture to the cylinders at all times. The installation of these packings requires but a few minutes and without the use of tools.



Apco Anti-Rattler Stand.

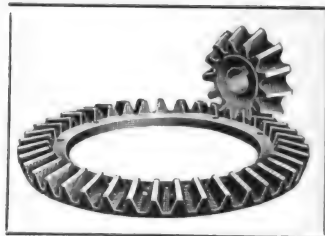
The Auto Parts Company is also supplying the dealer, through the jobber, with demonstrating stands for displaying the Apco valve spring remover, dash oil gauge and anti-rattlers. The first named displays the valve remover in operation. A valve, spring, valve guide, tappet and tappet guide are fitted to the stand and the valve remover is shown com-

pressing the spring. The oil gauge stand displays two oil gauges mounted in an upright position. These gauges are attached to the end of two arms, which extend from the centre of the stand. In the centre is a neat sign, which designates the purpose for which the article is used and also the price. The Ford anti-rattler stand displays four different types of anti-rattlers and is especially attractive. They are mounted at various angles on the sides of the stand. The name of the product, as well as that of the maker is displayed in the centre of the stand. A set of these stands should be of much service to the dealer in arranging his window display, as well as in disposing of his stock, as they are dumb salesmen, always demonstrating to the customer how he may better equip his car. A letter to the Auto Parts Company will bring the required information as to where and how these stands may be obtained.

MORE SPEED FOR FORD CARS.

Special Sets of Master Gear and Driving Pinion for Changing the Power Application.

Many Ford owners remodel their cars to what is known as a racetype. The object of the change is to develop speed. This can be obtained in one of two ways. If the motor is continually kept at high throttle, naturally all the power and speed that is available in the car will be developed. In the end this practise will result in rapid wear of the motor parts, which is brought about by extreme vibration. Another manner of obtaining greater speed and less vibration is to change the original ratio of the master driving gear in the rear axle to that of the driving pinion.



Master Gear and Driving Pinion.

The Detroit Radiator and Specialty Company, 961-3-5 Woodward avenue, Detroit, Mich., is marketing sets of master gear and driving pinion of ratios that will greatly increase the speed of a car in which they are used. The regular gear ratio of a Ford is 3%-1. This means that the driving shaft must turn 3% times to each revolution of the wheels. This company is making sets of gears that have ratios of 2 4/7-1 or 3-1. It is claimed that first ratio will afford a speed of 60 miles or better an hour, while the second, for more conservative drivers, will give a maximum of 55 miles an hour. The purpose of using these gears is to obtain greater speed at a decreased consumption of gasoline and oil. These gears are made of hardened nickel gear steel and are interchangeable with the present gears. A set of these gears having the ratio desired are sold for \$15 f. o. b. at the factory.

NATHAN COIL COVER.

A Special Water and Dust Proof Protection for the Ignition System of Ford Cars.

The Nathan Novelty Manufacturing Company, 84-86-88-90 Reade street, New York, N. Y., is making many specialties for Ford cars. One of its products is a coil cover, which should be of special interest to owners who have been troubled with ignition failure or defects. It is essential that the coil shall be kept dry. Should it become wet or even damp, there is great danger of it becoming polarized, which will result in uneven firing. This cover retails for 40 cents. As this company makes Ford specialties that are too numerous to mention individually in these pages, owners are recommended to write the address given above. Any inquiry that will mention the Automobile Journal will receive prompt attention. The company issues a catalogue that can be obtained at request.



Make Your Old Car Look Like New With **JOHNSON'S PREPARED WAX**

The Weatherproof Body Polish

it forms a thin protecting film over the varnish—it sheds dust and water—it greatly prolongs the life of the varnish—it prevents cracking and checking. It will make your old car look as well as a new coat of paint and varnish.

Does Not Gather Dust

Johnson's Prepared Wax imparts a beautiful hard, **dry** polish which will not collect dust. It preserves the varnish and protects it from the weather—it covers up small scratches—is clean and easy to use—and

"Sheds Water Like a Duck's Back"

Where the varnish has become rough, a perfectly smooth, new body can be built up with Johnson's Prepared Wax. Apply several coats, polishing each well and allowing a half-hour interval between coats. In many cases this will save the expense of having cars revarnished.

Hood and Fenders

can easily be kept shiny and new looking—an application of Johnson's Prepared Wax after every third or fourth washing will do the trick. Easy and inexpensive.

1 Pint 60c by Parcel Post—enough for a season's use.

Send us the attached coupon together with 10c in coin or stamps and we will forward postpaid a can of Johnson's Prepared Wax—sufficient for one application on a large car.

Agents wanted to sell Johnson's Prepared Wax.

S. C. JOHNSON & SON

"The Wood Finishing Authorities"
RACINE, WIS.

I enclose 10c for a can of Johnson's Prepared Wax—sufficient for one application on a large car. AJ4

Name _____

Address _____

City and State _____

My accessory dealer is _____

PRACTICAL FACTS FOR NEW CAR OWNERS.

The Herff-Brooks New Model "25"—Suggestions and Advice for Operation and Maintenance—Useful Accessories and Equipment.

THE Herff-Brooks Corporation, Indianapolis, Ind., has supplemented its line of four and six-cylinder cars with a new light five-passenger,

L head, four-cylinder, water cooled type, the cylinders having bore of $3\frac{1}{4}$ inches and stroke of $4\frac{1}{2}$ inches cast en bloc. By the S. A. E. formula the motor has a rating of 16.9 horsepower, but the manufacturer claims that this is very largely exceeded. The cylinders are cast with the water jackets integral, and with large passages to afford a free circulation of the water. The water jacket head is a large plate with the water manifold outlet integral, this construction permitting thorough cleaning of the cores and insuring a free movement of the water. The plate is secured to the cylinder block by a series of cap screws.

The valves are at the left side of the block and they are enclosed, studs and winged nuts retaining the cover plates. The fuel intake and the exhaust manifold are cast in one unit, this insuring the heating of the gas as it is drawn from the carburetor and affording thorough carburetion. The crankcase is a barrel type with an oil reservoir at the base, and the forward extension houses the timing gear and the rear bell housing encloses the flywheel and the clutch. The transmission gearset case is bolted to this bell housing.

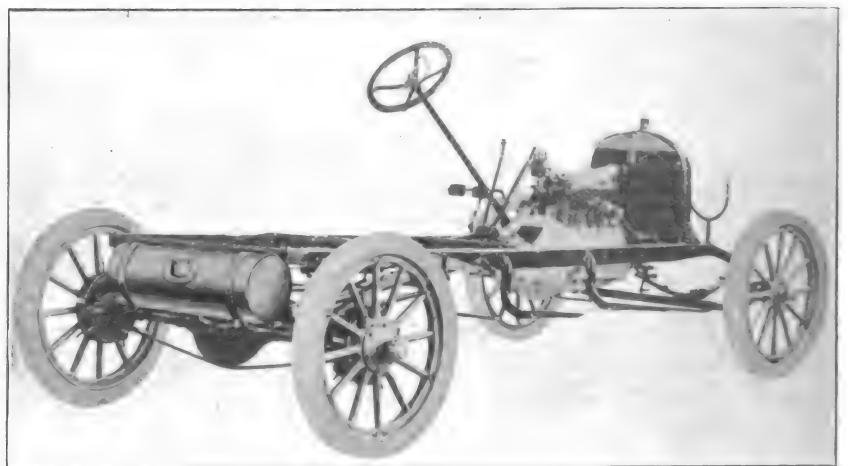


Herff-Brooks Model "25" Four-Cylinder, Five-Passenger Car, the Company's Latest Production.

four-cylinder machine that is known as model "25." The car sells for \$765 completely equipped for touring, and is made complete, as are the other Herff-Brooks' cars, at the company's plant at Richmond, Ind.

A feature of the new model is that, unlike a majority of other low-priced cars, the gasoline tank is carried in the rear, fuel supply being by a patent vacuum feed. Another quality is that the weight of the car is about 1500 pounds, giving with the high-speed, 25-horsepower motor, a horsepower to weight ratio of 60 pounds. It is intended that the new car will have high operating efficiency and a large gasoline mileage, and be extremely economical of tires. The company states that in cross-country tests an average mileage of 29 miles to a gallon of fuel has been attained.

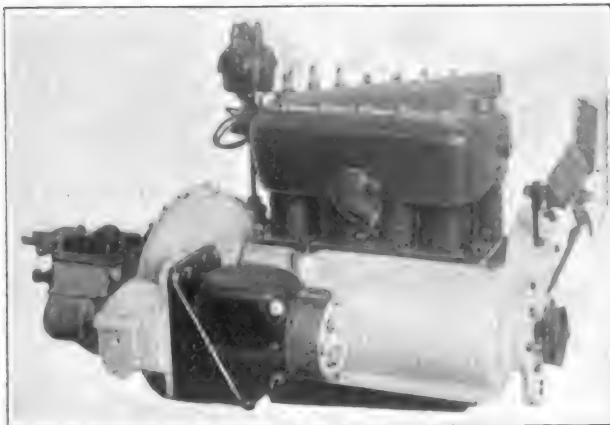
The unit power plant, which is a Perkins design, includes the motor, clutch and transmission gearset. It is an



Side View of Chassis of Model "25," Showing Gasoline Tank Carried in Rear.

The motor is cooled by a thermo-syphon circulation of water through a tubular radiator, and radiation is promoted by a fan mounted on a bracket that is carried on two of the bolts that retain the timing gearcase cover. The fan is driven by a flat belt from a pulley on an extension of the crankshaft. The lubrication of the motor is by a splash system. The carburetor is an automatic float feed type, and while on the valve side of the engine it is extremely accessible. The ignition is by the Disco system, which also includes the engine starter and the lighting of the car.

The clutch is a leather-faced cone, which has engaging springs underneath the leather facing, and the selective sliding gearset has three speeds forward and reverse, the gears being nickel steel and the main drive shaft being mounted on New Departure ball bearings. The device is through a propeller shaft, which is fitted with two uni-

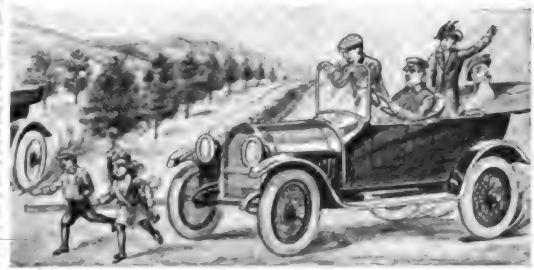


Unit Power Plant of Herff-Brooks Model "25."

versal joints, to a Salisbury floating rear axle that is fitted with both roll and ball bearings, and is trussed. A torque arm pivoted at the forward end to the frame cross member takes the driving thrust. The front axle is a drop forged I beam that is formed with the spring seats integral.

The rear springs are installed to a cantilever principle, they being shackled to the frame at the forward end, and pivoted at the centre and at the rear axle. The front springs are semi-elliptic. The wheels are artillery type and are furnished in the natural wood, and are equipped with demountable rims and 30 by 3½-inch Goodyear tires.

The steering column, which is equipped with a 17-inch wheel, is at the left side, the control for motor starting, clutch and service brake, being by the usual foot pedals. The throttle lever is mounted on top of the wheel, while the gearshift-



"Don't Gamble with Safety"

Life and Property are protected by brakes wherever motor vehicles are operated. The Owners who neglect their brakes are jeopardizing their own lives and properties to the same extent they jeopardize the lives and properties of others.

When Ordering Specify

(IMPROVED)



The Improved S-M-C brake lining is sold by the trade with the strongest guarantee that a manufacturer can give—service to the satisfaction of the customer, or a refund of the purchase price.

The customer is the judge of quality

NEW UNIVERSAL Ford Transmission Lining

A special quality for lining transmission bands, that has extreme endurance and obviates all transmission troubles. Sold with rivets, ready for installation. A special price will be given the trade and Ford owners for the next 30 days. Write today.

"SOMETHING MOR'N COTTON."

STAYBESTOS MFG. CO.

Germantown, Philadelphia, Pa.

Makers of

Asbestos and Rubber Packings, Gaskets and Radiator Hose

When Writing to Advertisers, Please Mention The Automobile Journal.



HARRIS
TRADE MARK REG. U.S. PAT. OFF.
OILS
AND
GREASES

PARAFFIN Vs. ASPHALTUM

A good base—a quality foundation is just as essential in the manufacture of a high grade lubricant as in the construction of a great building.

HARRIS OILS and GREASES have a paraffin base, and bear in mind that paraffin is a lubricant. Some inferior oils have an asphaltum base. Asphaltum is not a lubricant—in fact it retards lubrication. You know that. Not a trace of asphalt in HARRIS.

Then which will you decide upon for your motor car, your motorcycle, or your motorboat—America's Leading Lubricants or something cheaper that may ruin the machinery?

HARRIS OILS are economical, for
"A Little Goes A Long Way And Every Drop Counts"

Our oils sold in Bbls., Half Bbls., 5 Gal. and 1 Gal. Cans.

A. W. HARRIS OIL CO.
326 S. Water St. Providence, R. I.
Branch: 143 No. Wabash Ave., Chicago, Ill.

ALDING PORCELAIN PLUGS




Regular
75c Value
50c
EACH

Write for a gallon of the famous
"ALDING" Oil, in "DUOR" Can, 75c Delivered
ALSTEN & GOULDING COMPANY
36 Foster Street, Worcester, Mass.

Tarvia PREVENTS DUST PRESERVES ROADS
Booklets on request
BARRETT MANUFACTURING CO.

New York, Chicago, Philadelphia, Boston, St. Louis, Cleveland, Cincinnati, Pittsburgh, Detroit, Birmingham, Kansas City, Minneapolis, Salt Lake City, Seattle.



BRAENDER TIRES & TUBES



Are of the highest quality and the cheapest on mileage. They are built to last. Send for price list and particulars.

BRAENDER RUBBER & TIRE CO.
Main Offices and Factory, RUTHERFORD, N. J.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

ing and emergency brake levers are in the centre of the footboard. Both the service and emergency brakes operate upon the rear wheel drums, the former being external contracting bands and the latter internal expanding shoes, which are controlled by a hand lever.

The chassis has a wheelbase of 106 inches and the tread is the standard 56 inches. Black is the predominant color of the body and running gear. The body is of the modern streamline type and has a handsome appearance.

Only one type of body is installed with model "25," a five-passenger touring. The equipment supplied for the selling price is complete, including electric starting and lighting, ventilating windshield, Stewart speedometer, one extra tire rim, tire irons, straps and repair kit, dash, head and tail lights, and a one-man mohair top.

READERS' QUERIES.

Suggestions to Owners on Motor Misfiring, Loss of Power, Motor Overheating, Carburetor Trouble, Etc.

Carburetor Trouble—B. E. Y., Oldtown, Me.

Can you advise me through your columns how to adjust a single jet type Holley carburetor? I have never been troubled with this carburetor until recently, but on a hill, or in first or second speeds, it continually backfires. I have tried several adjustments, but without avail.

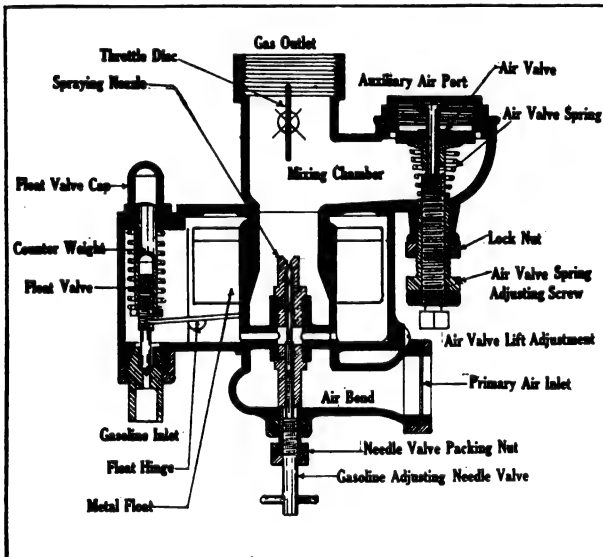
From your letter the writer is of the belief that you are being misled by what you term carburetor trouble. As your motor backfires only when climbing a grade and in first and second speeds, I would advise you to determine if the carburetor is getting the necessary supply of gasoline. The valve at the tank may not be turned on full, or there may be a stoppage in the pipe which runs from the tank to the carburetor. In the latter case the supply will be uncertain at all times. When climbing a grade, or when using the first or second speeds, the motor uses a greater amount of gas than when running on a level at high gear. The supply of gas may be sufficient for running on the level, but on a grade, or in first or second gears, the gas will be absorbed quicker than it can be supplied. If there is any water in the gasoline, or the fine sieve in the carburetor is clogged, backfiring will occur.

A sectional view of a Holley single jet carburetor is shown in the accompanying sketch. The gasoline valve is a tapered needle which enters the mouth of the fuel nozzle from the bottom of the carburetor. The valve should be turned to

the right until it becomes tight, which will cut off the supply of gasoline to the mixing chamber. It should then be opened by a three-quarter turn to the left. Starting the motor at low throttle adjustment should be made by turning the valve either way until the motor runs smoothly. The throttle should next be thrown open quickly. If the engine hesitates or backfires the air valve at the top should be given a stronger tension. This can be done by screwing up on the adjusting screw, which is shown in the sketch. Only in unusual cases should the gas level be changed, as it is correctly set before leaving the factory.

Engine Failed to Run—F. I. H., Newark, N. J.

I am the possessor of a ——— touring car which I bought second-handed from a local dealer. The motor ran well until last Sunday, when I went to the barn to start it. I cranked and primed it many times, but could



Sectional View of a Holley Carburetor, Showing Fuel Supply Adjusting Valve, Etc.

not get it to start. As the car was all right when I ran it in and has never been touched, can you suggest what the trouble might be?

There are only three chief reasons for an engine failing to run. Either there is no spark, gas or compression. Of course there are a number of secondary causes, but it will be found that they come under these general headings. As your car was in good running order when you left it and has not been tampered with, there can be no serious trouble. You, of course, have ascertained if there is gasoline in the tank. Many times gasoline will leak at the needle valve in the carburetor, and if the gasoline was low it may have all drained off. I would suggest that you test the spark. This can best be done by removing a

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Write today for
our Territorial Agree-
ment on the New

\$1,000

Inter-State
"FOUR"

The ONE popular priced car with
the greatest selling arguments
in the country

INTER-STATE MOTOR CO.
804 W. Willard St.,
MUNCIE, IND.

Model
BX-4

HEINZE

HECO

HEINZE MAGNETOS are superior both mechanically and electrically. Equip with HEINZE and your Ignition requirements will be satisfied.

HEINZE ELECTRIC COMPANY

Factories—Lowell, Mass. Sales Offices—Detroit, Mich.
Branch Offices—New York, Detroit, Chicago, Minneapolis.
New England Agent—Arthur Patch Homer, Boston, Mass.

Thermoid

**HYDRAULIC COMPRESSED
Brake Lining-100%**

THERMOID RUBBER CO., TRENTON, N. J.

F. SHIRLEY BOYD

175 Massachusetts Ave., Boston, Mass.

R. I. V. Ball Bearings.

Baldwin Chains and Sprockets. J. H. Sager Line.

DIXON'S

contains the only form of graphite that will not ball-up or pack under pressure. Booklet No. 210-G.

Made in Jersey City, N. J., by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827

GRAPHITE GREASE NO. 677
For Transmissions and Differentials

HOTEL LONGACRE

Broadway & 47th Street

**More Like a Club Than a Hotel
Exclusively Bachelor**

Convenient to Everything. The refined air and good service of a club.

RATES PER DAY

50 rooms with lavatory....	\$1.00
150 rooms with private bath	1.50
50 rooms with private bath	2.00
Two-room Suites,	\$3.00 to \$4.00
Special Weekly Rates	

Restaurant a la carte.

Club Breakfasts.

Dining room Open to Ladies.

**The best value in New York City
both in rooms and restaurant.**

Phone, 7790—Bryant
J. G. BOGGS.

Write for full
particulars



**Why Freeze Yourself?
Ruin Your Auto?**

**The Superior
Safe Garage Heater**

SAFE. NO FUMES.
NO GASES

Equipped with pilot light. No
matches, no danger, no discomfort.
An ideal positive heater.

SUPERIOR MANUFACTURING CO.

N. S. Pittsburgh, Pa.

The Fastest Riding
Car in the
World

MARMON

F. E. WING
562 Commonwealth Ave.
BOSTON, MASS.

New England Dealer for

NORDYKE & MARMON CO., Indianapolis, Ind.

MARMON "41"
\$3250

132" Wheelbase

MARMON "48"
\$5000

145" Wheelbase

REXO II \$3⁸⁵

The GARFORD MANUFACTURING COMPANY, 2506 Olive St., ELVIRA, O.
Successors to THE DEAN ELECTRIC COMPANY.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

spark plug and grounding it on the cylinder. Open all the petcocks and, with the switch turned on, spin the motor and watch for the spark at the grounded plug. Next, test the cylinders for compression. Close all the petcocks and, with the switch turned off, turn the motor over very slowly. If the compression is escaping a loud hissing sound will be heard. These are the only causes that will prevent a motor from running. Sometimes there may be gasoline in the tank and none in the carburetor. This can be discovered by priming the carburetor until the gas escapes. If it is found that there is no gasoline in the carburetor, first make sure that the supply is fully turned on at the tank, and secondly that there is no stoppage in the pipe leading from the tank to the carburetor.

Ignition difficulties may be due to dirty or improperly set spark plug points, broken or cracked plug porcelains, short circuiting of cables, loose connections, worn out battery, slipping or worn-out magneto drive, which will effect the timing, worn or burnt magneto points, etc.

The cause of lack of compression can generally be found in the valves, which frequently stick in the guide. They should be loosened by a liberal application of kerosene. Not infrequently the valve seats will become pitted or the valve become warped, in which case they should be re-ground if possible, or replaced. Pieces of carbon sometimes lodge between the valve and the seat, thus allowing the compression to escape. Usually the exhaust valve will be found to be the offender. If the valve closes tightly, but leaves a space between the valve stem and the lifter, adjustment should be made at the lifter until it reaches a point where there is only a very slight clearance under the valve stem when closed. Each valve should be set accordingly.

Adjusting Gears in Rear Axles—J. Q., Webster, Mass.

Recently I have been troubled with the gears in the differential becoming noisy, as well as the housing becoming so warm that I cannot bear my hand upon it. Can you suggest what this trouble may be?

There are many factors that will cause the differential gears to become noisy; as to heating there can only be two reasons, either there is a lack of lubricant in the housing or the bearings fit too tightly. If the gears are too deeply in mesh they will produce heat as well as make undue noise. Not knowing the exact type of car that you run, I cannot give the exact illustration, but as the principle is invariably the same on all cars, you may be able to get the required information from the accompanying sketch. Usually

there are two adjusting collars on the differential housing, one on either side. When the master differential gear is too deeply in mesh with the driving pinion, the bolts on each adjusting collar should be loosened and the adjusting collar "A" turned to the right and adjusting collar "B" screwed to the right, thus forcing the whole housing, with the master differential gear attached, further away from the driving pinion. When the proper adjustment has been made collar "B" should be securely tightened and collar "A" should be turned to the left until it is tight against the gear, after which it should be turned back to the right until there is a play of about .005 of an inch. This back lash is absolutely necessary, as without it there would be friction between the collars and the roller bearings that would produce heat. Many times it will be found that the driving pinion gear is not meshing with the master differential throughout its entire surface, and this must be adjusted by the pinion

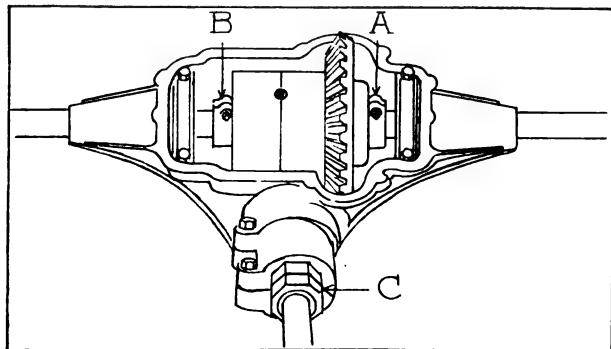


Diagram Showing the Adjusting Parts of Differential Gear.

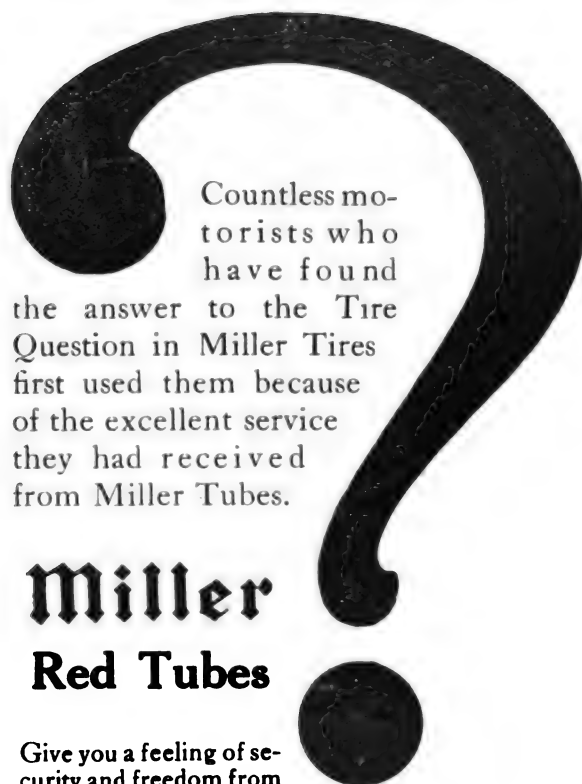
gear adjusting collar. On most cars these collars are controlled by two nuts, located at the point of the housing ("C") where the drive shaft enters. One of these nuts serves as a lock, while the other is the real adjuster. As stated above there are many cars where the adjusting members are placed differently, but the principle remains the same. If the gears are worn they will be noisy and the only remedy is to replace them.

HOW MUFFLER IS UTILIZED.

It is a well known fact that whenever explosions occur in a confined space, the escaping gas is of a higher pressure than the surrounding air, and the resulting sound is proportionate to the difference in the pressures. This can be demonstrated effectively by the sound produced from a discharged gun. Practically the same sound is

When Writing to Advertisers, Please Mention The Automobile Journal.

Through the Tube to the Tire!



Countless motorists who have found the answer to the Tire Question in Miller Tires first used them because of the excellent service they had received from Miller Tubes.

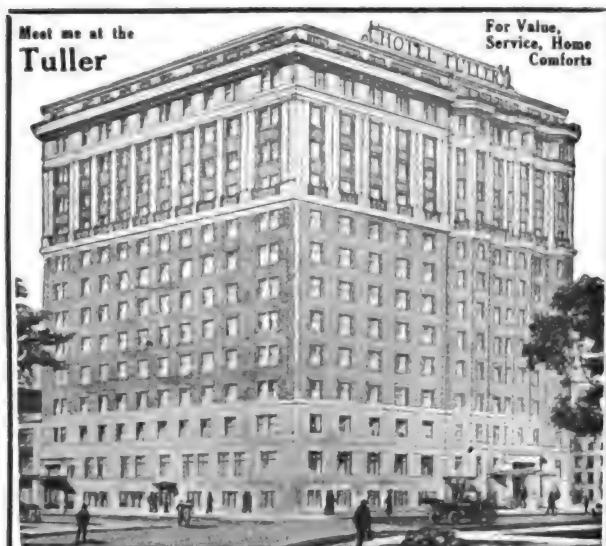
Miller Red Tubes

Give you a feeling of security and freedom from Tube troubles because they are built of pure gum by the careful Miller Method. They are heavy and strong, yet so exceptionally elastic that they do not lose their shape. Double reinforcement at the valve, by means of a large strong base, gives additional protection where wear is most severe.

The Miller Dealer has the size tube you need. Have him show you these strong, highly elastic, serviceable tubes!

The Miller Rubber Co.
Akron, Ohio, U. S. A.





New HOTEL TULLER Detroit, Michigan

Center of business on Grand Circus Park. Take Woodward car
get off at Adams Avenue.

ABSOLUTELY FIREPROOF

200 Rooms, Private Bath,	\$1.50	Single,	\$2.50	Up, Double
200 " " " "	2.00	"	3.00	" "
100 " " " "	2.50	"	4.00	" "
100 " " " "	3.00 to 5.00	"	4.50	" "
Total 600 Outside Rooms. All Absolutely Quiet.				
Two Floors—Agents' Sample Rooms		New Unique Cafes and Cabaret	Excellent	



SPEDOLENE solves the problem of automobile and motor truck gear lubrication. One trial is all we ask. "A fair field and no favor" will demonstrate to your satisfaction that SPEDOLENE is the King of all lubricants for gears.

Henry H. Kroh, Boston Distributor.
MANUFACTURED BY
Continental Asbestos Corporation, Worcester, Mass.

MOTOR PARTS COMPANY

OFFICIAL

BOSCH DISTRIBUTOR

Zenith Carburetor Mohawk Tires Leak-Proof Rings

155-187 Columbus Avenue, BOSTON
818 No. Broad St., PHILADELPHIA SPRINGFIELD, MASS.

Peerless Quality in Smaller Size

"ALL PURPOSE" FOUR AND SIX

FOUR AT \$2,000

(Sixes \$250 Extra)

THE PEERLESS MOTOR CAR CO., CLEVELAND, OHIO

Makers also of the "48-Six" and Peerless Trucks.

Licensed under The Kardo Patents.

AUTOMOBILE ELECTRIC LIGHTING SPECIALTIES

For the Automobile Owner and Manufacturer
who wants SERVICE for his money

ELECTRIC LIGHTING SPECIALTIES Made to Order

CULVER-STEARN'S MFG. CO.

Worcester, Mass.

Detroit, Mich.

When Writing to Advertisers, Please Mention The Automobile Journal.

produced by the firing of the compressed gas in the gasoline engine cylinder and when one considers that the engine has from 200 to 1000 such reports a minute when in operation, it can be readily understood why a muffler is needed. The silencing is a simple achievement. The gas is led through a pipe into a muffling device, where it is made to expand to almost atmospheric pressure before it is discharged into the air. Not only is the gas made to expand, but it is also broken into a series of streams instead of remaining in one. This is accomplished by the muffler being divided into several separate compartments. This device muffles the exhaust gases and discharges them into the air with a hissing sound.

DRIVING IN CAR TRACKS.

Some motorists constantly drive in street railway tracks, a practise that is hazardous for tires, as one cannot tell when metal will be passed over or the tire will come into contact with a switch frog that has an exceptionally sharp point. When tires are inflated to standard pressures they may be uncomfortable for riding over uneven cobble stones, and the smooth surfaces of the rails will attract drivers who do not realize that the grinding of the steel wheels of the electric cars often make sharp edges which may cut or puncture pneumatic tires. Of course the degree of wear depends upon the circumstances, such as the weather, weight of the car, speed of travel, the judgment of the driver, etc. If rails are driven, exceptional care should be taken to avoid the points of frogs and switches, as frequently these are worn almost to a razor edge sharpness and are particularly damaging if the tires are wet.

CARE OF THE SPRINGS.

It is imperative that the leaves of automobile springs should receive a certain amount of lubricant at various intervals. There are many devices which have been placed upon the market for prying the leaves apart, but in the absence of any of these the leaves may be easily separated by loosening the spring shackles and jacking the frame of the car so as to release the weight from the spring. The leaves can then be pried apart by a screw driver or any other similar pointed tool. When spread apart, a mixture of graphite and grease (either one alone will do) should be spread as evenly as possible over the leaves. The weight of the car sometimes causes the lubricant to work out to the edges of the leaves, and this surplus must be removed.

If the spring eyes are made of soft material, they may wear. They should be replaced by hardened steel bushings. Worn shackles should be replaced, and also badly worn or cut shackle bolts. When replacing the latter it is well to make some provision for lubricant by drilling holes in the bolt. The best method of doing this is to drill from the end to about the centre of the bolt and then drill down through the centre until it registers with the first drill hole. A recess can then be cut in the surface of the bolt, which will distribute the lubricant for the entire surface of the bearing. The opening of the first hole can be tapped so as to receive a grease cup. It is advisable to do this to old shackle bolts that are otherwise in good condition.

LOSS OF CYLINDER COMPRESSION.

As the power of the gasoline motor is generated by internal combustion, the gas supplied as fuel must be compressed and its pressure maintained. Not infrequently one cylinder of an engine loses compression, a condition that effects the uniformity of movement, as well as the power of the engine. If it is a new car a close inspection should be made of all the joints and connections on the weak compressing cylinder. The best method is to remove all the spark plugs from the motor except that on the weak cylinder, and squirt kerosene around the threaded part of the spark plug and the valve plugs. Next turn the engine over very slowly on compression and note if the kerosene bubbles. If so, this will indicate a partial loss of compression. This will often be found to be a trouble with a new car, but frequently through faulty construction or workmanship, the compression may be lost at the piston rings or valves.

A sure test that will determine whether or not the compression leak is at the rings is to remove the lower part of the crankcase or, if it is fitted with a crankcase cover it will be sufficient to remove this and have somebody slowly turn the engine. A loud hissing on the compression stroke will indicate that the rings are leaking. The cylinder should then be removed and the rings examined. It may be that the rings have so turned that the slots of two or more register, and if this is the case the remedy is placing the slots at equal distances apart. If certain sections of the rings are dark or slightly discolored, it will indicate that the hot gases are escaping at these points. Many times rings can be expanded by placing strips of metal behind the leaking section, but if the motor has been used but little it will be advisable to insert new rings.

If the car has been run for any distance on an

The Oil That Gets You There

No grade too steep, no road too sandy, when you lubricate with

Polarine

Polarine Oil keeps your motor in first-class condition. Least carbon, least friction—best compression, best mileage—with Polarine, the standard oil for all motors.

*At all garages and dealers
Use Socony Motor Gasoline*

STANDARD OIL CO. OF NEW YORK

New York
Buffalo



Albany
Boston



DIXIE 20TH CENTURY MAGNETO

A full spark at lowest possible engine speed, increasing in intensity to top engine speed with none of the lag at higher speeds associated with timer distributors—

this is the

20th Century DIXIE

SPLITDORF
Electrical Co.
NEWARK, N. J.

 (All SPLITDORF features are fully covered by patent or patents pending)

Mea MAGNETOS

S. R. O. BALL BEARINGS

Sole Importers

MARBURG BROS., 1790 Broadway, NEW YORK



BALL BEARINGS REGROUND

at one-fifth the cost of new, also New Single Row Annular, Thrust, New Departure Double Row and Radax Bearings.

AHLBERG BEARING CO.

Boston Chicago Detroit
New York Los Angeles Cleveland

VALVOLINE OIL CO.

Heavy, Medium and Light

Automobile Oils

27 STATE STREET BOSTON, MASS

(When Writing to Advertisers, Please Mention The Automobile Journal.)

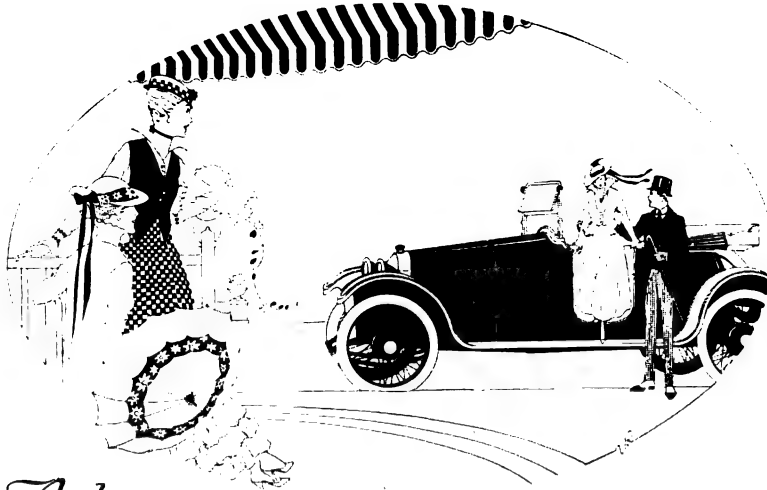
insufficient amount of oil or without water in the radiator, the cylinder may be scored, and this can best be determined by removing the piston. If it is scored, the only possible remedy is to rebore the cylinder, and if this is not practicable it will have to be replaced by a new member. If the trouble has not been located in the piston or cylinder, the cause must exist in the valves. Usually the exhaust valve will be found to be leaking and this should be either reground or replaced. Many times carbon deposits on the valve seat will prevent the valve seating. The carbon should be removed and the valve reground. There should also be a very small clearance between the valve stem and the valve plunger.

CARE OF TIRES.

Many experienced drivers do not realize the necessity of keeping pneumatic tires up to the inflation pressure. Many reduce the pressure, claiming the car rides easier, while others keep the pressure low because they do not take the care to properly inflate them. When blowouts and rim cuts happen they assume or believe the cause to be the faulty design or construction of the tires. Guessing or assuming that the tires are fully inflated is extremely expensive. The cost of tires may be from five to 20 per cent. of the market value of the car, and anyone who does not exercise the greatest of care must expect large tire expense.

There is no reason why tires should not be inflated to a standard, as a pressure gauge can be purchased for a very small sum. Without question more power is required to drive a given load over a stated surface with tires not fully inflated than is necessary with tires that are up to the maker's pressure standard. Nothing definite has ever been determined as to what proportion of power is gained or lost by the variance of tire pressure, but it can be effectively demonstrated to those who have ever ridden a bicycle. It will be recalled that tires that were well inflated were ideal for riding purposes and did not require as much effort to ride the machine, but when the tires were soft much more strength was needed to push through sandy surfaces.

With good inflation the tire does not yield so much in the upper side walls and there is less possibility of failure of the fabric near the beading or near the rim flanges. There is much less chance of shedding a shoe and meeting with a serious accident when the tires are fully inflated, as the pressure in the tube will keep the beads under or firmly against the rim flanges. When



Admiration is pride transferred to the onlooker, an induced respect for judgment, or appearance.

Scripps-Booth cars are built with pride, and constructed with self-respect, and are the apex of motor car luxury, art, finish and performance at any price in any weight.

Scripps-Booth

Scripps-Booth cars therefore induce in the onlooker and bystander a respect for ownership, an admiration for the possessor, that is attained by no other car of medium weight in America.

To admire is to enjoy. Our nearest salesfloor is therefore a place of pleasure to those motor car connoisseurs who appreciate quality of mechanism, luxury of riding, and of appointment.

SCRIPPS-BOOTH COMPANY, DETROIT, MICHIGAN

the operator is experienced he will learn when to slightly reduce the air pressure and when not to. On very hot days, or when intending to travel at fast speed for a considerable distance, it may be well to slightly reduce the tire pressure. Experience alone can determine the reduction that can be made, but it will be found that five pounds will be sufficient for almost any purpose. There can be no question that the friction of the tire on the road will generate heat, and when a high temperature has been reached the rubber will become plastic and the compound will soften, so that the plies of fabric of the tire will lose anchorage and weaken the tire. In this condition the tire will not withstand the full pressure and what is commonly termed a "blow out" will result. In cool or extreme cold temperatures the tires should always be kept at full standard pressure.

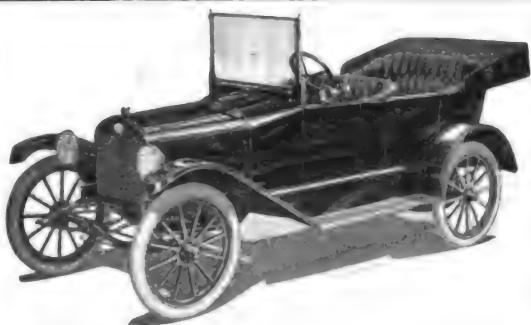
PAINTING BRASS.

Polished brass cannot be painted over unless it is first treated with a coat of shellac. This may be applied as thin as one wishes, but it should be thoroughly dried before applying the paint. Once dry, it can be painted any desired

color, the shellac forming a surface to which the paint will adhere, and will itself adhere to the smooth brass. If you do not desire to apply a number of coats, the shellac may be darkened to the desired color before applying. This may be applied to the radiator as well as other brass parts, as the shellac will stand a higher degree of heat without cracking than can the radiator itself without damage.

NECESSITY OF COOLING SYSTEMS.

Most every one knows that when a firearm is discharged a few times in quick succession the barrel becomes so hot that the hand cannot be borne upon it. If the weapon is repeatedly discharged in this condition, the free passage of the bullets may become difficult on account of the bore becoming distorted by high temperature. This heat is due to two causes, the first and most important being the emission of hot gas from the burnt powder; the second being the increase of temperature resulting from the friction of the bullet against the wall of the barrel. This same principle is true with the gasoline engine, although the cylinder walls are well lubricated and the friction of the piston results in little or no



CONSIDER, for example, the prospective purchaser who is well informed. He is familiar with all of the little points, as well as the big features, that enter into the make-up of a strictly first class car. When you show him the

METZ '25'

The Quality Car

and he finds that ALL of these good points, and ALL of these up-to-date features are embodied in this new Touring Model, he knows he has found the car he wants. \$600 equipped complete, including Gray & Davis electric starter and lights.

DEALERS—Write for new catalog "Q."

METZ COMPANY, WALTHAM, MASS.

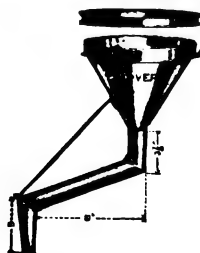
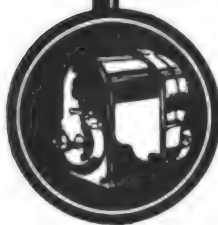
EISEMANN

The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.

The Eisemann Magneto Company

Sales and General Offices,
32-33d St., Brooklyn, N. Y.

New York, N. Y. Indianapolis, Ind. Detroit, Mich.
123 W. 52nd St. 415 N. Capitol Av. 802 Wd'w'd Av.



**NEW DOVER
TWO-IN-ONE
Offset Funnel**

**New Cone Strainer
New Braced Spout**

**Removable Spout
Forming a Regular Funnel**

Send for New 1914 Catalogue

DOVER STAMPING & MFG. CO.

(4)

CAMBRIDGE, MASS.

heat. The engine does, however, generate considerable heat from the hot gases that result from each explosion, and so some provision has to be made for cooling the cylinders. This may be accomplished by directing a column of air against the cylinders, which are surrounded by a great number of projecting pins or needles. This is called the air cooled system, and is accomplished by the heat of the cylinder running to the ends of the pins, at which point they are easily cooled by the force of air. The other method of cooling an engine is by water circulation. This is done in two ways, either by natural or mechanical circulation. It is obvious that if no means were provided for replenishing the supply of water around the cylinder, it would soon boil and evaporate. For this reason it is necessary that the water be always kept in circulation and provision made for the reduction of temperature. This is accomplished by passing the water through a number of small passages which are exposed to the cooling action of the air. The device in which the water is cooled is called the radiator. Frequently a power driven fan is attached to the front of the engine, which materially aids the cooling system.

CASE HARDENING CAST IRON.

Cast iron parts that are exposed to wear can be made much more durable by case hardening. A compound should be made of pulverized prussiate of potash, sal ammoniac and saltpeter in equal parts, thoroughly mixed. A bath should be made of two ounces of prussiate of potash and four ounces of sal ammoniac to each gallon of water necessary. The process requires the cast iron to be heated to a red, then rolled in the powder, and while still red hot quenched in the bath.

TEMPERING BATH FOR STEEL.

A very satisfactory tempering bath for steel may be found very useful in shop work, especially if a good grade of tool steel is not immediately available. With this cold chisels, centre punches, flat drills, etc., may be hardened. Into six quarts of clear rain water mix an ounce of corrosive sublimate and two pints of common salt, and stir the mixture until thoroughly dissolved. With this as a bath the tools are dipped and drawn in the usual manner. The compound has the effect of hardening and toughening steel.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

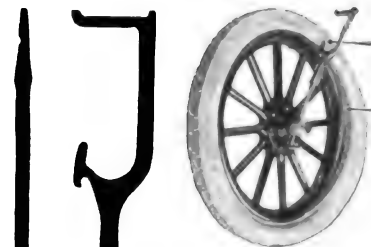
CARING FOR CHAMOIS.

A piece of chamois, such as used for polishing bodies, is somewhat like a razor strop, in that it must be worked in before it reaches its efficiency. A new skin is full of an oily substance and will leave a fine fuzz on the body. For this reason it should be first used on the running gear, with which one is not so particular as the body.

"OFF-AN-ON" TIRE TOOL.

A Device Equally Useful on the Road or in the Garage for Handling Clincher Shoes.

The Stewart Accessories Company, 820 West Warren avenue, Detroit, Mich., manufacturer of many automobile specialties, is producing a special tire tool that



Tool Used for Replacing Tire.

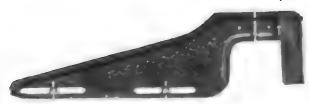
"Off-an-On" Tire Tool.

should recommend itself to owners who have not demountable rims on their cars. The device is shown in the accompanying illustrations. The tire tool consists of two pieces and claim is made that with it one can remove a clincher tire more quickly than with any other equipment. This tool should prove to be extremely useful for Jitney car owners who wish to make quick changes of shoes so that service can be continued without loss of valuable time. The tools are used together and can be adjusted for use for removing and replacing clincher shoes of any size. The device retails for \$1 a set. This tire tool has much to recommend it and anybody who is interested may secure a pamphlet from the Stewart Accessories Company, which illustrates and gives instructions for its use.

THE MILWAUKEE BRACKET.

Combination Holder of Rear Registration Plate and Tail Lamp That Has Many Qualities.

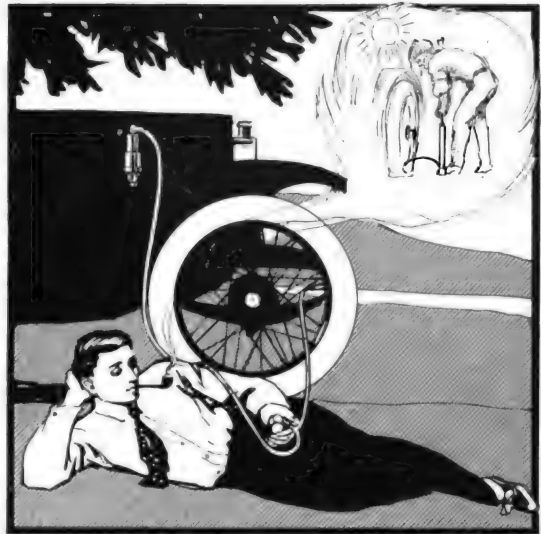
The Milwaukee Auto Engine and Supply Company, 706-8 Winnebago street, Milwaukee, Wis., manufacturer of automobile accessories, is manufacturing a desirable



Combination Lamp and Registration Plate Bracket.

type of bracket that will hold the rear registration plate and also the rear light. This equipment should be extremely interesting to owners who do not want to deface their cars by bolting the registration plate to the body. When straps are used to hold the plates the vibration of the car causes the plates to rattle and the plates are often lost when the straps wear. This bracket will fit all standard lamp clamps. The rear light is then placed on the bracket spindle and the plate is fitted to the other end of the bracket by small bolts tightened with thumb nuts. The light is then in a position to fully illuminate the plate so that the law is complied with. The bracket is made entirely of stamped steel and is claimed to be non-breakable. This bracket comes with a round or square lamp spindle as desired and retails for 40 cents.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Make Tire Pumping a P-L-E-A-S-U-R-E

There's a way to enjoy next summer's heat when a tire "goes flat." There's a way to laugh in the face of the hot sun and make tire pumping—

A Recreation

—a chance for a quiet smoke, while a MAYO Spark Plug Pump, and your motor, do the work.

MAYO SPARK PLUG PUMP

An Economy

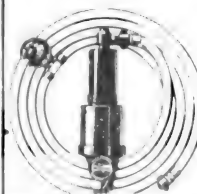
—you can't afford to overlook. It costs much less than one ruined casing—and it can save many—while taking the place of backache producing hand-pump tussles.

The MAYO comes complete—For \$10

—equipped with 12 ft. hose, gauge, and all connections. Pumps fresh, pure air only. Adapted to any car. Substituted instantly for any spark plug. Built with metal rings, like your motor—and lasts as long. You can test a MAYO—

On 30 Day Free Trial

—on your own car. MAYO Q. D. Spark Plug \$1.50 extra; MAYO Ford Pump, \$8, complete; MAYO valve cap pump, \$15, complete.



MAYO
Mfg. Co.
66 E. 18th St.
Chicago





Recognized as the **high-est grade** lubricant on the market. Consistently retains the patronage of the great majority of car owners who **know** that the **best** lubricant is the **cheapest**, because it protects their car investments **most surely**.

Automobile manufacturers recommend it.
Try it out on your own car.

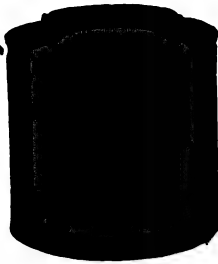
"K. No. 00 Special" grade for sliding gear transmission.

"K. No. 000" for differential, compression cups and all bearings.

Reduced prices for 1915. Ask your dealer.

Sold by leading dealers everywhere. Look for the orange-colored can bearing sprocket-wheel trade-mark shown above.

New York & New Jersey Lubricant Co.
165 Broadway, New York. 1430 Michigan Ave., Chicago, Ill.



Tires Last Longer

Goodyear Vest Pocket Tire Tester

Worth dollars to you every month, because it helps tires to give more mileage. Carry one with you on every trip, in your pocket or tool kit. Test the tire pressure to see that it is just right. Don't trust to luck, for a pressure too low means many punctures, rim-cuts, tread separation, structural breakdowns. Use this Goodyear "Tire Saver" and have the pressure just right. All Goodyear dealers carry them. Price is \$1.25, and they will last a lifetime. For there is nothing to break or get out of order.



The Goodyear Tire & Rubber Co., Akron, Ohio
Makers of Goodyear Automobile Tires

Why Pay Excessive Hotel Rates?

THE NEW AMSTERDAM

Euclid Avenue at 22nd Street, CLEVELAND, OHIO

A five minutes walk from the active centres, yet overlooking the most beautiful residence section of Cleveland.

"The logical resting place for tired Tourists."

Large airy suites of from two to five rooms (also single rooms.)

GARAGE NEARBY

RATES:—\$1.50 per day, each person
Dining Room Modified *a la Carte*

A. A. McCASLIN, Managing Director

L. McNAMARA, Manager

(When Writing to Advertisers, Please Mention The Automobile Journal.)

SAMSON TIGER HAND HORN.

An Extremely Efficient Signal That Can Be Adapted to Many Conditions for Convenient Operation.

The Puritan Machine Company, 411-417 Lafayette boulevard, Detroit, Mich., sales agent for many well known automobile accessories, has placed in the market a hand operated warning signal which is retailing for \$5, and is the Samson Tiger Hand Horn. The horn is operated by a handle which projects from the side, which with a slight turn will produce a loud tone. There are five different positions in which this horn can be mounted, so that the handle can be placed in any desired position. The horn can be operated by the elbow when the handle is located on the inside. The company claims that the wheel operated horn is absolutely reliable, for it cannot be damaged nor can it become jammed or broken.

The horn is fitted with an adjusting screw on the diaphragm plate for regulating the tone. This horn is well adapted for motor boats and if a long blast is desirable the company will supply a special handle, which is six inches longer than the standard for 25c. This horn is made and guaranteed by the American Electric Company, Chicago, Ill., which company will repair it free of cost should it ever become impaired through defect of workmanship or material and has not been tampered with. The horn can be secured in a black and nickel, black and brass or all black finish without extra charge.

SEISS MECHANICAL HORN.

A Hand Operating Warning Signal That is Guaranteed by the Manufacturer for 10 Years' Service.

The Seiss Manufacturing Company, Toledo, O., is manufacturing the Seiss Model A Horn, which is shown in an accompanying illustration, which does not require batteries and needs no adjustments. The maker lays emphasis on the fact that a subdued or loud tone can be produced as desired.

The horn is manually operated by turning a handle that is located at the back. It is double-acting and the continuous tone may be produced by turning the handle either to the right or left. No springs are used in the construction of the horn. The sounding diaphragm is made of vanadium steel, the small gears are machine cut and the contact point and toothed wheel are tempered.

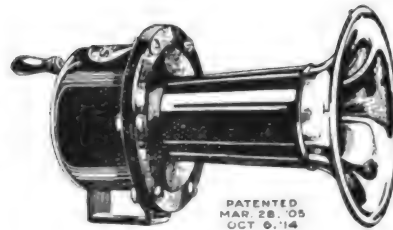
Statement is made that Seiss Horns will endure indefinitely, as the material and workmanship are the best that can be procured. The Seiss Manufacturing Company warrants this horn to give satisfactory service for 10 years and will replace any defective parts free of charge if these are returned to the factory.

The horn is finished in black enamel that is baked to 300 degrees Fahrenheit with a highly polished nickel bell or brass bell, or it can be procured entirely in black. The price of this device is \$4.

JUNKUNG KEYLESS LOCK.

A Simple Combination Accessory That is a Certain Protection Against Theft or Forgetfulness.

Among the many automobile specialties that are furnished by the Imperial Automobile Supply Company, 95 Chambers street, New York, N. Y., is a lock that can be used for many purposes. The company has listed it in its catalogue as the "Junkung" Keyless Lock. This lock requires no key, as it is opened by means of a combination which is only known by the operator. There can be no annoyance from a lost or forgotten key and there



The Seiss Model A Mechanical Horn.

PATENTED
MAR 28, '05
OCT 6, '14

is no possibility of anybody having a duplicate.

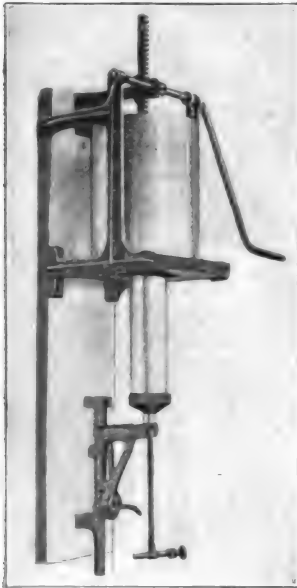
When the lock is placed on an article it cannot be removed until the combination is worked, which is a protection that a key lock cannot afford. The lock is made of brass and retails for 80 cents.

HANDY GREASE GUN LOADER.

A Very Useful and Economical Equipment That Can Be Made Use of Generally.

H. H. Colson, 3225 Dickens avenue, Chicago, Ill., is manufacturing a device for the filling of grease guns that has much to recommend it to garages, repair shops and to owners and operators of machines. The common way of filling grease guns is

to push the grease into the cylinder with the fingers or a stick. This is a very tedious and greasy operation. With the "Handy" Grease Gun Loader the manufacturer claims that any person can load a grease gun in five seconds without waste or the usual annoyances for the operator. The loader is mounted in an upright position on a wall or post. A metal frame holds a cylindrical shaped tank in which the grease is placed. A piston fits into the tank and is operated by a rack that serves as a piston rod into which is worked a pinion on a cross shaft that is turned by a hand crank. Below the tank is a bracket arrangement for holding the grease gun while it is being filled. A latch is fitted to the bracket, which is slidable on a rack, so that adjustment may be made for any length of grease gun. The gun nozzle fits into a hole at the bottom of the tank and is held upright so that by turning the crank the grease is forced down into the barrel of the gun.



The Handy Grease Gun Loader.

This loader should prove to be a very useful equipment in garages where many cars must be greased, because of its economy, cleanliness and time and labor saving qualities. Grit and dirt cannot enter the tank, so a good, clean lubricant is available at all times. The price of this device is \$5.

EZY-FOLDING TIRE SAVERS.

Extremely Practical Equipment That Can Be Used by the Private Owner or the Service Station.

Among the many automobile specialties and accessories that are listed in the catalogue of the Commonwealth Motor Specialty Company, Jackson, Mich., is an equipment specially constructed for jacking a car when not in use. Continuous pressure on a tire is very detrimental, as when a car is started, or not in use, the strain is concentrated and deforms and weakens the structure. This company is selling jacks which fit the hub of the wheel and raise the car. The jack consists of an adjustable arm and a lever. The lever is placed at an angle and the arm adjusted under the hub of the wheel. By lifting the lever the arm raises the wheel. The company has called it the Ezy-Up Folding Tire Saver. A set of four that are adaptable to Ford cars can be bought for \$3.75.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Clean Carbon From Cylinders

COMPLETE GENERATING AND DECARBONIZING OUTFIT

\$15



Not too large for the small garage or shop, but large enough for any business a shop can do.

A complete equipment, fully guaranteed, and extremely economical to operate.

No tanks to handle, with material always ready, any person can use it and make money.

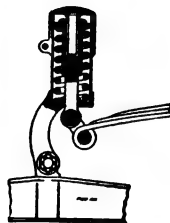
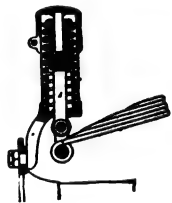
Will clean carbon from a cylinder in three minutes. Oxygen is generated in three minutes.

Saves time, labor and material, and does the best work science can conceive.

"O.G." Ford Shock Absorbers THE SET OF FOUR \$9

Can be attached in 15 minutes, are adjustable when attached, and are automatically adjusted by the load. Thoroughly lubricated by grease cups. No rattle or squeak.

Sold with a guarantee for satisfaction during the use of the car, covering material, workmanship and complete absorption of shock. Purchase price refunded if not satisfactory. Method of attaching to rear spring of Ford car is shown by this illustration.



Extreme spring action with this absorber attached to the front spring is shown in this illustration of the manner of installation. The spring tension is adjusted by turning the cap, lessening or increasing the pressure.

No questions asked if refund is requested. The user is the one who must be satisfied.

Write today for Jobbers' and Dealers' Discount Sheets and Special Literature.

Oxygen Generator Co.
301 River Street TROY, N. Y.

The A. J. Automobile Library

(Including All of the Famous A. B. C. Books)

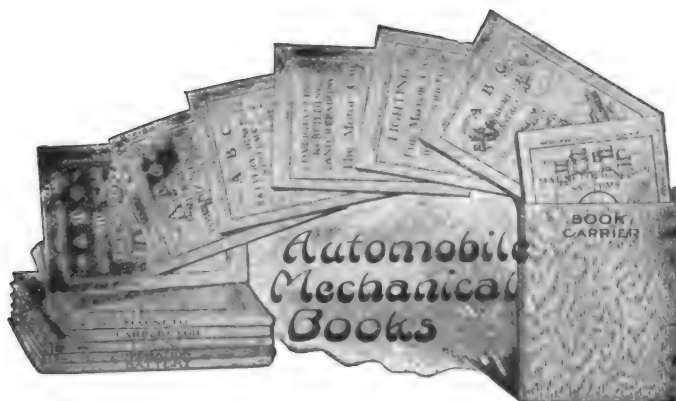
**A Complete Library of
Automobile Mechanics \$4.75**

Transportation Charges Prepaid

Distinct Books—1000 Pages of Text—All Copies Indexed—2000 Illustrations,
Including Practical Working Page Charts and Trouble Finders.

Books written by recognized authorities. Especially prepared for those
who have to do with the sale, care, repair and operation of motor vehicles,
their parts, equipment, accessories, etc.

**The practical information in these works cannot be secured through any other
series or number of books or for 50 times what is charged for this library.**



Engine	35c	Chassis	25c
Magneto	35c	Lighting	50c
Carburetor	35c	Operation	50c
Battery	35c	Overhauling	50c
Tires	25c	Motorcycle	35c

Truck Operation \$1.00

Automobile Journal Publishing Company

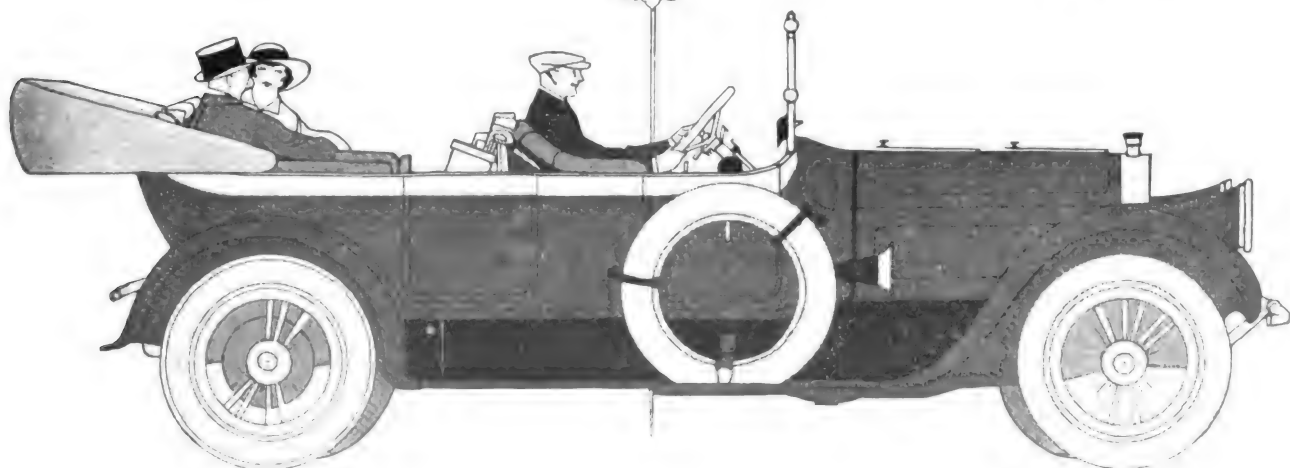
Times Building

Pawtucket, R. I.

PIERCE- ARROW

Upon service you build your daily plans, of an inconceivable complexity, all of which would be thrown into confusion if the Pierce-Arrow missed at any point, but which are carried out to a perfection of nicety every day—not once on some fortunate, red-letter day, not on alternate Wednesdays or odd Fridays, but every day in every year.

THE PIERCE-ARROW MOTOR CAR CO
BUFFALO NEW YORK



Safe in the Grip of
Multibestos

The Brake Lining
of Quality



¶ There is no question about which is the best brake lining for this is a point which has been proved time and again by engineering tests. Don't take our word for it, but write at once for the signed reports of these tests.

STANDARD WOVEN FABRIC COMPANY

FRAMINGHAM, MASSACHUSETTS

Sales Branches

BOSTON

F. Shirley Boyd, 175 Massachusetts Avenue

CHICAGO

F. E. Sparks, 1430 Michigan Boulevard

PHILADELPHIA

N. A. Petry Co., Inc., 1309 Race Street

SAN FRANCISCO

Fred Ward & Son, Inc., cor. First and Howard Streets

AUTOMOBILE JOURNAL

\$1.50 the year
10 cents the copy

PAWTUCKET R.I.

May 10, 1915

YOUR NEW CAR

*Why it needs special care during the
first 1000 miles*

YOUR automobile, in one respect, is like any other piece of machinery. It "settles down" only after use. If well maintained it will run better the 2,000th mile than the first.

Motor trouble and undue noises are too often caused by early neglect. The metal worn off by friction is gone forever.

And your lubricating oil is your only protection against this friction wear.

At all times, and especially during the important "settling down" period, when the moving parts have not fully adjusted themselves to each other, oil of the highest lubricating efficiency is of the utmost importance.

Each piston makes several thousand strokes per mile

The effects of the wrong oil will not be noticed during the

first piston stroke, or the second. But when the piston strokes run up into the millions—and that does not take long—friction begins to get its due. You do not have to *look* for the wear then. You *hear* it.

Realizing the need of scientific help, careful motorists are turning for correct lubrication to the Vacuum Oil Company's Chart of Automobile recommendations. Send today for a copy of this guide.

The oil specified insures high lubricating efficiency through its correct *body* and superior *quality* and throughout the life of the car insures a low operating cost per mile. The continued efficiency of the motor is full evidence of the way in which the oil protects each moving part. The carbon deposit is rarely troublesome. And the "wear" of the oil itself is unusual.



In buying Gargoyle Mobiloils from your dealer, it is safest to purchase in original packages. Look for the red Gargoyle on the container. For information, kindly address any inquiry to our nearest office.

The four grades of Gargoyle Mobiloils, for gasoline motor lubrication, purified to remove free carbon, are:

Gargoyle Mobiloil "A"
Gargoyle Mobiloil "B"

Gargoyle Mobiloil "E"
Gargoyle Mobiloil "Arctic"

VACUUM OIL COMPANY, Rochester, N. Y., U. S. A.

Specialists in the manufacture of high-grade lubricants for every class of machinery. Obtainable everywhere in the world.

DOMESTIC BRANCHES:

DETROIT BOSTON NEW YORK CHICAGO PHILADELPHIA INDIANAPOLIS MINNEAPOLIS PITTSBURGH
Ford Bldg. 49 Federal St. 61 Broadway Fischer Building 4th & Chestnut Sts. Indiana Pythian Bldg. Plymouth Bldg. Fulton Bldg.



Take The "Drudge" Out of Tire Changing

Note the Simplicity of Goodyear Rims

This is for men who seek a remedy for many of their tire troubles. Blow-outs and punctures must occur sometimes. Mishap and misuse come to every tire.

But it's the "hardship" in changing tires that causes most of your troubles. When tires are quickly replaced you think nothing of it.

We suggest, if you want to banish future tire distress, that you adopt Goodyear Rims.

The Side Ring Lifts Right Out

In taking a tire off a Goodyear Rim; there is only one working part—the spring steel side flange, and it *lifts right out*.

You can easily remove this flange with one hand, as the picture shows.

Locking rings, lugs and latches are things of the past now. There are no parts to stick, grip, or rust-on in the Goodyear Rim.

You don't have to attack a tire with a tool chest now. A common screwdriver or a tire-iron is the only tool you need. And you don't have to "pound the rim to pieces" when you replace the tire on the wheel. Simplicity is the keynote of Goodyear Rim-Success. You will want these rims, too, when you know them.

Both in One, Detachable and Demountable

Goodyear Rims are both detachable and demountable. This is impossible with any split type demountable rim.

The Goodyear is a *solid base* rim. It is the lightest demountable rim on the market with the detachable feature. It won't pinch the tube or permit squeaking; it won't allow water and dirt to penetrate the tube—all common faults of split base rims.

The wide rim base is a very distinctive feature.

This gives you extra air space—the effect of a larger tire.

Manufacturers Specify Goodyear

Manufacturers are steadily adopting Goodyear Rims. Price is not a consideration with them where car owners' comfort is at stake.

Ease of Goodyear Rim operation has won them for their cars. Yet the cost to car owners is no more than for rims of lesser worth.

Dealers too, are pushing Goodyear Rims. They have found they give the best satisfaction—for they save in time, in tires, in troubles. Write today for book, "Goodyear Rims." Address Desk 46.



THE GOODYEAR TIRE & RUBBER COMPANY, AKRON, OHIO

Makers of Goodyear Automobile Tires.

(2337)

\$3500 in 25 Cash Prizes

WINTON SIX



To the chauffeurs who make the best service records in the Winton Six Repair Expense Contest of 1915, the Winton Company will pay cash prizes of \$3500.00, as follows:

First	\$500	Sixth	\$100	Eleventh	\$100	Sixteenth	\$100
Second	400	Seventh	100	Twelfth	100	Seventeenth	100
Third	300	Eighth	100	Thirteenth	100	Eighteenth	100
Fourth	200	Ninth	100	Fourteenth	100	Nineteenth	100
Fifth	100	Tenth	100	Fifteenth	100	Twentieth	100

And Five District Prizes of \$100 Each.

This will be the Eighth Annual Contest for Winton Six Chauffeurs. Somebody will win this money. Why not win a prize yourself?

Absolutely no entrance fee or other expense on the part of the chauffeur or his employer will be required.

Every employed driver of a Winton Six car, no matter what model, may compete for these money prizes.

If you do not drive a Winton Six you will not be entitled to compete.

But if you are a Winton Six driver, send us the name and address of your employer, and your own name and address, and we will supply you with report blanks. Write to

The Winton Motor Car Co.

131 Berea Road,

Cleveland, Ohio, U. S. A.

The owner of the Model 21-A \$2285 car making the best record in this contest will get a new 21-A car free in exchange for his old car

(When Writing to Advertisers Please Mention The Automobile Journal.)

COE'S WRENCHES



UNEQUALLED FOR QUALITY THE WORLD OVER

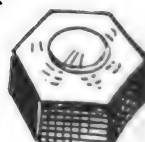
The wrench is the most used and the most useful tool in a motorist's kit.

COE'S Special Automobile Model is a perfect tool. The jaws are hardened special quality tool steel to withstand hard usage, and the handle is long to afford great leverage. The wrench is thin to work in space inaccessible for ordinary wrenches.

Coe's Special Automobile Model wrench is a tool kit in itself. Coe's quality costs slightly more, and it is worth many times the price of any other tool. A Coe's is always dependable, in the garage or on the road. Literature sent at request.

COE'S WRENCH COMPANY WORCESTER, MASS.

Distributors: { J. C. McCarty & Co., 21 Murray Street, } New York City
 { John H. Graham & Co., 113 Chambers Street, }



(When Writing to Advertisers Please Mention The Automobile Journal.)



MAKE TIRE PUMPING A P-L-E-A-S-U-R-E

There's a way to enjoy next summer's heat when a tire "goes flat." There's a way to laugh in the face of the hot sun, and make tire pumping—

A Recreation

—a chance for a quiet smoke, while a MAYO Spark Plug Pump, and your motor, do the work.

MAYO *SPARK PLUG* PUMP

An Economy

—you can't afford to overlook. It costs much less than one ruined casing—and it can save many—while taking the place of back-ache-producing hand pump tussles.

The MAYO comes complete—For \$10

—equipped with 12 ft. hose, gauge, and all connections. Pumps fresh, pure air only. Adapted to any car. Substituted instantly

for any spark plug. Built with metal rings, like your motor—and lasts as long. You can test a MAYO—

On 30 Day Free Trial

—on your own car. MAYO Q. D. Spark Plug, \$1.50 extra; MAYO Ford Pump, \$8, complete; MAYO valve cap pump, for permanent attachment to motor, \$15 complete.

MAYO MFG. CO., 66 E. 18th St., Chicago

(When Writing to Advertisers, Please Mention The Automobile Journal.)

SPRINGFIELD CONVERTIBLE BODIES



THE limousine and the touring car are completely satisfactory only in certain seasons. The new Springfield Demi-Convertible body has no such limitations; it is the all-year, all purpose body.

More and more in America, as in Europe, the tendency is to demand protection from the sun, the dust and sudden showers even in touring. This body with its permanent top provides such protection, while it gives plenty of air and an unobstructed view. It may be converted into a limousine.

Dealers will be surprised at the responsiveness of their customers to the appeal of this new production.



SPRINGFIELD METAL BODY CO.
SPRINGFIELD, MASS.



In Tune with Every Typist's Touch

Regulate the new Royal like a watch! Turning a simple setscrew pictured here adjusts the Royal to fit any typist's touch—makes the day's work shorter and easier for *EVERY STENOGRAPHER*.

Get the Grind out of Typewriting!

EVERY stenographer and every office manager who knows the real work-saving power of the new Royal Master Model 10; is now doing easily a bigger day's work with *less* effort—and always at *less* cost per letter for the "Boss."

Nobody can fool these keen-witted typists—they *know*. They have seen how the new Royal with its *personal* touch, its *all-day speed* and greater accuracy—literally takes the "grind" out of typewriting.

And even the "Boss" himself has noted how the sunshiny smiles came into the faces of the stenographers after the Royals came, and has marked their friendly speed rivalry. But maybe he wondered why.

The secret is there in the racing keys of the Royal. Picture a typewriter where you can just "tune up the keys" to fit your own personal touch, your own *personality*—actually *YOURSELF*!

Then think of the Royal as a typewriter of *TRIPLE SERVICE*—for it types letters, cards, and *bills*, all without stopping a second or using any sort of attachment! The *one* machine does it *ALL*!

Royal "*Better Service*" is something every typewriter buyer should investigate *now* because it *PAYS*. Write for this free Brochure and a beautiful Color-Photo of the new Royal showing *all* of its new features. This advertisement pictures only one.

ROYAL TYPEWRITER COMPANY, Inc.
Royal Typewriter Building, 363 Broadway, New York
Branches and Agencies the World Over



ROYAL

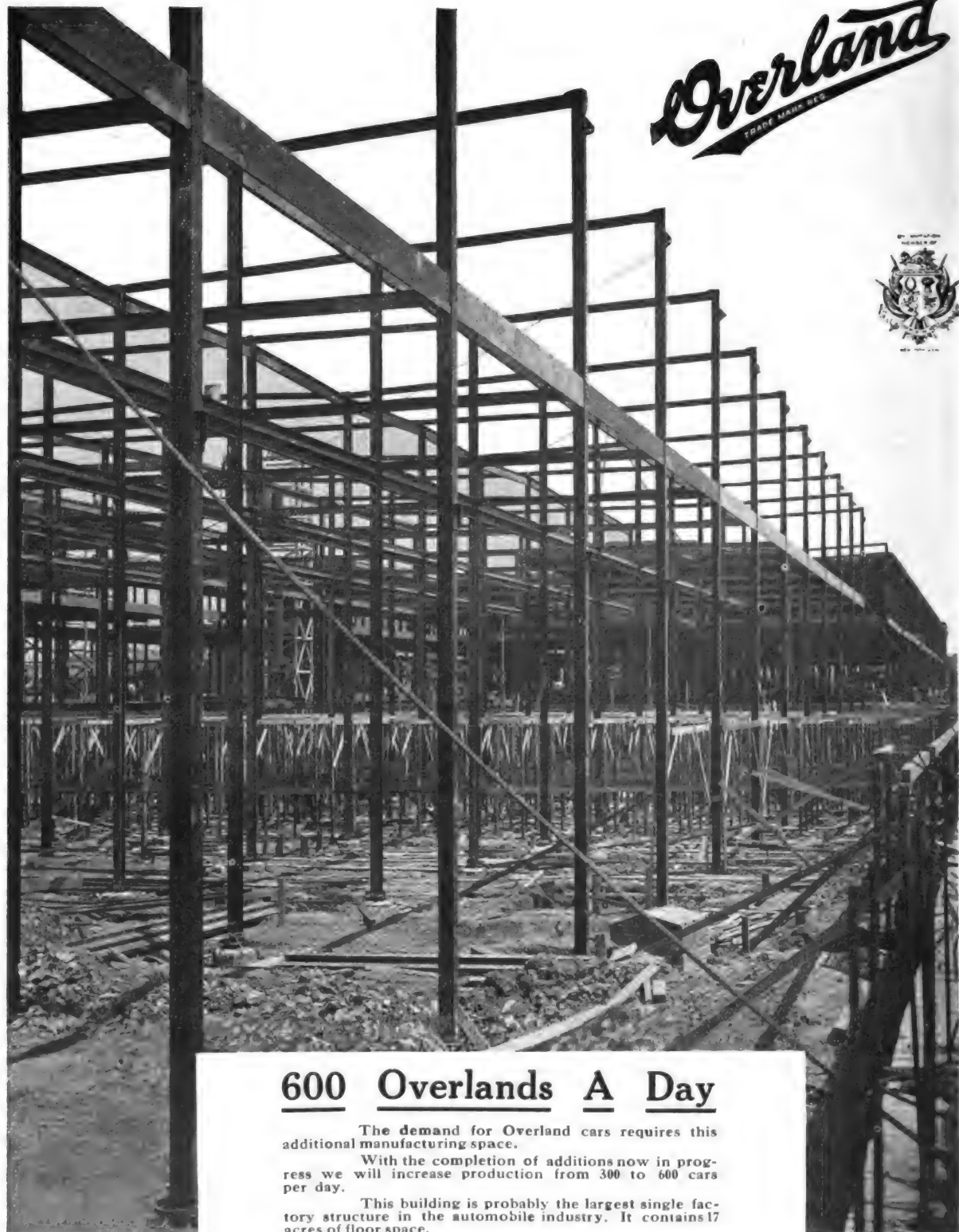
STANDARD

Typewriter

Master-Model 10

Built for "Big Business" and its Expert Typists

(When Writing to Advertisers Please Mention The Automobile Journal.)

600 Overlands A Day

The demand for Overland cars requires this additional manufacturing space.

With the completion of additions now in progress we will increase production from 300 to 600 cars per day.

This building is probably the largest single factory structure in the automobile industry. It contains 17 acres of floor space.

Construction was started January 2.

It will be completed June 1.

"Made in U. S. A."

The Willys-Overland Company, Toledo, Ohio

(When Writing to Advertisers Please Mention The Automobile Journal.)



Insurance Doesn't Prevent Fire

It simply indemnifies you for whatever loss you may suffer to property, and it does not compensate for the inconvenience, sacrifice of time, or the cessation of use of your machine

Pyrene Protects Against Fire

It's better than insurance because it is instantly available when wanted, it is absolutely dependable, it does not deteriorate with time, and the extinguishers can be used innumerable times with positive results.

Its practical value is evidenced by the reduction of 15% in your insurance premium. Can be carried in any car without inconvenience. Insurance companies recommend it.

Pyrene Brass and Nickel-Plated Extinguishers, one-quart capacity are included in the lists approved by the National Board of Fire Underwriters

PYRENE COMPANY OF NEW ENGLAND

88 BROAD STREET

BOSTON, MASS.

(When Writing to Advertisers Please Mention The Automobile Journal.)

COLE 4

STANDARDIZED

Cole Dealers are Making Money

THE COLE FOUR IS STRICTLY STANDARDIZED, all important units being the products of America's greatest motor car specialists, the acknowledged **bests**.

IT IS THE MOST ATTRACTIVE FOUR ever produced by this permanently established Company, which has been building successful Fours for five years.

FULL SEVEN-PASSENGER COMFORT—The wheelbase is 120 inches. Aisle-way front seats and out-of-the-way reserve seats make a "chummy," friendly seven-passenger equipage. The upholstery is genuine leather and genuine hair—it is deep and soft. The appointments of the car are superb.

A WONDERFUL HILL CLIMBER—A $4\frac{1}{4} \times 5\frac{1}{4}$ motor coupled with a road-ready weight of 3,200 pounds makes it a glutton for the hills. Direct drive spring suspension and balanced building make it stick to the road.

EXTREMELY QUIET—A perfectly counter-balanced four-cylinder motor producing a quietness once thought impossible. Noiseless helical bevel gears. This same perfect balance makes the car free from vibration.

ECONOMY—This car holds the American official fuel economy record made at the Indianapolis Speedway, October 9, 1914, under the auspices of the A. A. A.



Cole "Four" Roadster, complete

\$1485

f. o. b. the factory

A complete line of models

COLE MOTOR INDIANAPOLIS

COLE EIGHT

STANDARDIZED

Because Cole Cars are Selling Fast

THE COLE EIGHT IS ALSO STRICTLY STANDARDIZED—all its units being the products of America's same great specialists—the acknowledged bests of their kind.

THE COLE EIGHT DEVELOPS SEVENTY HORSE POWER with a road-ready weight of only 3,400 pounds.

WILL OUT-DEMONSTRATE all your competition, climbing hills better, getting away quicker and showing more flexibility and road possibilities.

THE LARGEST EIGHT-CYLINDER MOTOR used in any American car (Bore $3\frac{1}{2}$, stroke $4\frac{1}{2}$)

ABSOLUTE ACCESSIBILITY to all working parts.

FULL SEVEN-PASSENGER COMFORT—Wheelbase 126 inches. Direct drive spring suspension. Noiseless helical bevel gears. Aisle-way front seats. Out-of-the-way auxiliary seats. Smooth power-flow. Positive noiseless brakes. Luxurious deep upholstery. Superb appointments with recognized refinements

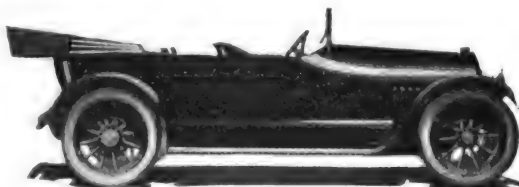
EXTREME ECONOMY made possible by a low first cost, low up-keep, due to the quality of materials and wide strength-margins. The even flow of power, lightness and balance make it easy on tires and chassis.

Cole "Eight" Touring, complete

\$1785

f. o. b. the factory

A complete line of models



CAR COMPANY

INDIANA U.S.A.

Index to Advertisers.

Page	Page
Ahlberg Bearing Co.....74	Times Square Automobile Co..10
Alsten & Goulding Co.....68	Tuller Hotel.....72
Barrett Manufacturing Co....65	Vacuum Oil Co.....Cover
Bosch Magneto Co.....71	Valvoline Oil Co.....74
Boyd F. Shirley.....69	Vanderpool Company, The....10
Braender Rubber & Tire Co..68	Weed Chain Tire Grip Co....68
Coes Wrench Co.....2	Willys Overland Motor Car Co. 6
Cole Motor Car Co.....8-9	Winton Motor Car Co.....1
Continental Asbestos Corp...72	Zenith Carburetor Co.....Cover
Culver Stearns Mfg. Co.....72	
Dixon Crucible Co., Jos.....71	
Dover Stamping & Mfg. Co...76	
Eagle Oil & Supply Co.....10	
Eisemann Magneto Co.....76	
Garford Mfg. Co.....70	
Goodyear Tire & Rubber Co. ....Cover	
Harris Oil Co., A. W.....68	
Hartford Suspension Co.....74	
Heinze Electric Co.....69	
Hotel Longacre.....70	
Hotel Majestic.....77	
Hotel New Amsterdam.....78	
Hotel Tuller.....72	
Indian Refining Co.....78	
Inter-State Motor Co.....69	
Johnson, S. C. & Son.....Cover	
Longacre Hotel.....70	
Lovell-McConnell Mfg. Co....80	
Majestic Hotel.....77	
Marburg Bros.....77	
Mayo Mfg. Co.....3	
Mea Magneto Co.....77	
Mecca Mfg. & Spec. Co.....10	
Metz Company.....76	
Miller Rubber Co.....15	
Milwaukee Auto Spec. Co....73	
Mossberg Co., Frank.....61	
Motor Parts Co.....72	
National Jitney, The.....71	
New Amsterdam Hotel.....78	
New Departure Mfg. Co.....73	
Nordyke & Marmon.....70	
N. Y. & N. J. Lubricant Co...78	
Oxygen Generator Co.....79	
Peerless Motor Car Co.....72	
Pyrene Co. of N. E.....7	
Reflex Ignition Co.....77	
Royal Equipment Co.....71	
Royal Typewriter Co.....5	
Scripps-Booth Co., The.....75	
Splittorf Electrical Co.....74	
Springfield Metal Body Co..4	
Standard Oil Co.....73	
Staybestos Mfg. Co., The....69	
Stevens & Co.....69	
Stutz Motor Car Co.....11	
Superior Mfg. Co.....70	
Texas Co., The.....73	
Thermold Rubber Co.....16	

ATTENTION

Garages
Supply Dealers
Automobile Agents

If you wish to save money in the purchase of your Automobile Supplies ask for Bargain Bulletin No. 12, from the

Mecca Mfg. & Specialty Co.

1743 Broadway,
NEW YORK

1208 Michigan Ave.,
CHICAGO

FOR SALE.

Shop Vulcanizer, Bargain.
Vanderpool, Springfield, O.

We sell everything pertaining to the automobile at half regular prices. Send for our great "PRICE WRECKER" No. 5, containing 3000 auto bargains at cut prices. **TIMES SQUARE AUTOMOBILE Co.** World's largest dealers. S. W. Cor. 56th St. and Broadway, N. Y. 1210 Michigan Avenue, Chicago.

Accessory and Garage Journal

A Distinct Trade Publication

Guaranteed to Have an Exclusive
Trade Reader Distribution of

20,000 Copies

Each Monthly Issue

**Without a Competitor
in Its Field**

Detailed Advertising Information
at Request

Accessory and Garage Journal
Times Building, Pawtucket, R. I.

IMITATED

BUT NOT
DUPLICATED

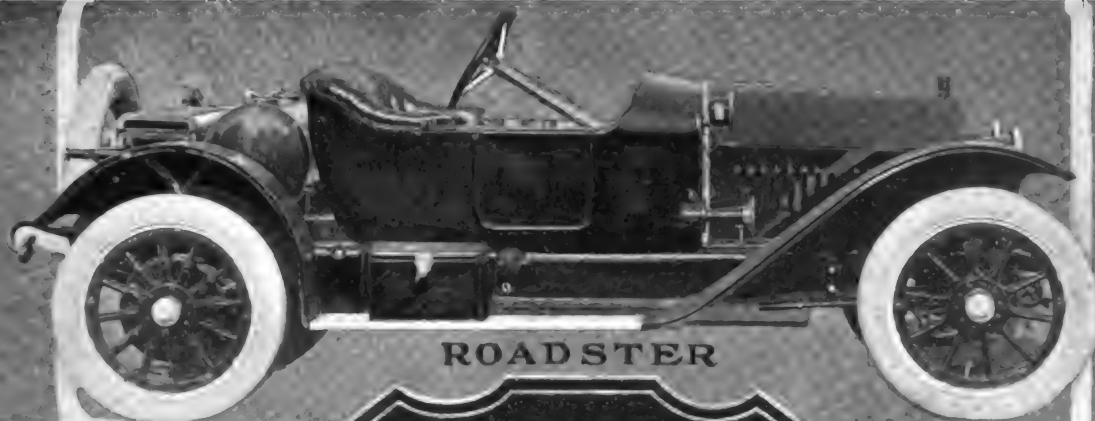
EAGLE
NO-KARBON
AUTO OIL

THE OIL THAT SUITS
AND DOES NOT SOOT.

Carbon in your cylinders means loss of power. Customers report 10,000 to 15,000 miles with no carbon troubles. A good motto: TRY ANYTHING ONCE. **EAGLEINE NO-KARBON AUTO OIL** is furnished in 1-5-10 gallon, 30 and 50 gallon Steel Drums with faucets for which no extra charge is made.

**EAGLE OIL
AND SUPPLY CO.**

104 BROAD STREET, BOSTON, MASS.



ROADSTER



America's Standard for Motor Cars

A recognition won by consistent service wherever used.
A reputation established and known to all who know
what makes automobile quality.

STUTZ design and construction is proven by supremacy
won in the greatest road and track races of the na-
tion, against all comers.

STUTZ superiority is not in design and construction alone
but in service also, where convenience, comfort and
luxury are also important factors.

STUTZ cars maintain their prestige for highest quality
with thousands of discriminating owners.

FOUR-CYLINDER.

H. C. S. Roadster	\$1475
Beareat	2000
Roadster	2000
Bulldog	2250
Touring	2275
Sedan	3075

SIX-CYLINDER.

Beareat	\$2125
Roadster	2125
Touring	2400
Sedan	3800

There are STUTZ Agencies in All Principal Cities.

STUTZ MOTOR CAR COMPANY, Indianapolis, Indiana

When Writing to Advertisers, Please Mention The Automobile Journal.

Buyers' Reference and Guide.

ACCESSORY MANUFACTURERS AND JOBBERS.

Alsten & Goulding Co., Worcester, Mass.
Auto Parts Co., Providence, R. I.
Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.
Times Square Auto Co., 56th St., at Broadway, New York City.

AIR COMPRESSORS AND TANKS.

Brunner Mfg. Co., Main Office and Factory, Lucca, N. Y.; New York Office, Hudson Terminal Bldg., 30 Church St. (Brunner.)
Williams Foundry & Machine Co., Akron, O.

ANTI-RATTLERS.

King Specialty Mfg. Co., Brookline, Mass.

ARBOR PRESSES.

Bartlett, Edwin E., 322 A St., Boston. (Greenerd.)

AUTOMOBILE ACCESSORIES.

Gemco Mfg. Co., 743 So. Pierce St., Milwaukee, Wis.

AUTOMOBILE PARTS.

Gemco Mfg. Co., 743 So. Pierce St., Milwaukee, Wis.

AUTOMOBILES. (See Cars.)

AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

Motor Specialties Co., Waltham, Mass.

BALLS AND BALL BEARINGS.

Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1790 Broadway, New York City; 805 Woodward Ave., Detroit.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (R. I. V.)

Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)

New Departure Mfg. Co., Bristol, Conn. (New Departure.)

Norma Co. of America, 1790 Broadway, New York City. (Norma.)

BEARING METALS.

Bunting Bronze and Brass Co., 727 Spencer St., Toledo, O. (Bunting.)

BODIES—WOOD AND METAL.

Highland Body Mfg. Co., Cincinnati, O. (Highland.)

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

BRAKE BANDING OR LINING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Multibestos.)

Royal Equipment Co., 1378 Bostwick Ave., Bridgeport, Conn. (Raybestos.)

Standard Woven Fabric Co., Framingham, Mass. (Multibestos.)

Staybestos Mfg. Co., Lena and Armat Sts., Germantown, Philadelphia, Penn. (Staybestos.)

Thermold Rubber Co., Trenton, N. J.

BRUSHES, WIRE.

Williams Foundry & Machine Co., Akron, O.

CABLE, AUTOMOBILE.

Packard Electric Co., The, Warren, O.

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARBURETORS.

Air-Friction Carburetor Co., Dayton, O. (Model C.)

Zenith Carburetor Co., Detroit. (Zenith.)

CARS—GASOLINE PLEASURE.

Inter-State Motor Co., 804 West Willard St., Muncie, Ind. (Inter-State.)

Metz Co., Waltham, Mass. (Metz.)

Nordyke & Marmon Co., Indianapolis (Marmon.)

Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Scripps-Booth Co., Detroit. (Scripps-Booth.)

Stutz Motor Car Co., Indianapolis. (Stutz.)

White Co., Cleveland, O. (White.)

Willys-Overland Co., Toledo, O. (Overland.)

Winton Motor Car Co., 131 Berea Road, Cleveland, O. (Winton.)

CARS—GASOLINE COMMERCIAL.

Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)

Chase Motor Truck Co., 106 West St., Syracuse, N. Y.

Duplex Power Car Co., Charlotte, Mich. (Duplex.)

Federal Motor Truck Co., Junction and Leavitt Sts., Detroit. (Federal.)

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

Independent Motors Co., Port Huron, Mich. (Independent.)

Jeffery Co., Thos. B., Kenosha, Wis.

Lanth-Juergens Motor Car Co., Fremont, O. (Fremont Mals.)

Packard Motor Car Co., Detroit, Mich.

Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Sanford Motor Truck Co., Syracuse, N. Y. (Sanford.)

Signal Motor Truck Co., Detroit. (Signal.)

Sullivan Motor Car Co., Rochester, N. Y. (Sullivan.)

White Co., Cleveland, O. (White.)

CARS—ELECTRIC COMMERCIAL.

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

CHAIN LUBRICANTS.

Motor Accessories Inc., 749 A Boylston St., Boston. (Chain-Lub.)

CHAINS, TIRE AND ANTI-SKIDDING DEVICES.

Weed Chain Tire Grip Co., 28 Moore St., New York. (Weed.)

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

CIGAR LIGHTERS. (See Lighters.)

COILS.

Heinze Electric Co., Lowell, Mass.

CONTROLLERS.

Pierce Speed Controller Co., Anderson, Ind.

CRANK HOLDERS.

King Specialty Co., Brookline, Mass. (King.)

CYLINDER CLEANING COMPOUND.

Bowling Green Sales Co., 42 Broadway, New York City.

Dyer Apparatus Co., Cambridge, Mass. (Oxy-Carbon.)

ELECTRIC LIGHTING EQUIPMENT.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FAN BELTS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

FIRE EXTINGUISHERS.

Pyrene Co. of N. E., 88 Broad St., Boston.

FORD AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

FORD HOODS AND RADIATORS.

Superior Lamp Mfg. Co., 136 W. 52nd St., New York, N. Y.

FORD STARTERS.

Hunter Auto Supply Co., Hunter Bldg., 333 W. Madison St., Chicago, Ill. (Hunter.)

Walden Mfg. Co., 73 Commercial St., Worcester, Mass.

FUNNELS, AUTO.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GEAR SETS.

Detroit Radiator Spec. Co., 961 Woodward Ave., Detroit, Mich.

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind. (Ross.)

GENERATORS.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Oxygen Generator Co., 301 River St., Troy, N. Y.

HEADLIGHT DIMMERS.

Chaney Co., L. F., Springfield, O. (Chaney.)

HEATERS.

Superior Mfg. Co., N. S., Pittsburg, Penn. (Superior Safe Garage.)

HORNS.

Garford Mfg. Co., Elyria, O. (Tuto.)

Lovell-McConnell Mfg. Co., Newark, N. J. (Klaxon.)

INSULATION.

Packard Electric Co., The, Warren, O.

JACKS.

Motor Specialties Co., Waltham, Mass. (Excel Auto.)

LAMPS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric Trouble.)

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Clamp.)

LEATHER GOODS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

LIGHTERS, CIGAR.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)

BUYERS' REFERENCE and GUIDE—Continued.**LIGHTING SYSTEMS, ELECTRIC.**

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Garford Mfg. Co., Elyria, O. (Dynalux.)

Malton Specialty Co., 775 Boylston St., Boston, Mass.

LUBRICANTS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)

Continental Asbestos Corp., Worcester, Mass. (Spedolene.)

Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)

Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagleline No-Karbon)

Harris Oil Co., A. W., 326 So. Water St., Providence, R. I.; 143 No. Wabash Ave., Chicago. (Harris.)

New York Lubricating Oil Co., 116 Broad St., New York City. (Monogram.)

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MotoRol, Non-Fluid, Kejex.)

Standard Oil Co., New York. (Polarine.)

Texas Company, 17 Battery place, New York City. (Texaco.)

Vacuum Oil Co., Rochester, N. Y. (Gargoylle Mobiloil.)

Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETO COVERS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.

Eisemann Magneto Co., 32 33d St., Brooklyn, N. Y. (Eisemann.)

Heinze Electric Co., Lowell, Mass. (Heco.)

Marburg Bros., 1790 Broadway, New York. (Mea.)

Splitdorf Electrical Co., 98 Warren St., Newark, N. J.

MAILING LIST.

Trade Circular Addressing Co., 166 W. Adams St., Chicago.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

MOTORS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Michigan.)

Wisconsin Motor Mfg. Co., Milwaukee, Wis.

PATCHES, TIRE.

Braender Rubber & Tire Co., Rutherford, N. J. (Cementless.)

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

PRESSES. (See Arbor Presses.)**PUMPS, TIRE.**

Kellogg Mfg. Co., Rochester, N. Y. (Kellogg.)

PUMPS, VALVE.

Hill Pump Valve Co., Chicago, Ill.

RADIATOR CEMENT. (See Cements.)

RADIATOR & HOOD COMBINATIONS.

Superior Lamp Mfg. Co., 136 W. 52nd St., New York, N. Y.

REAMERS.

Harding Distributing Co., Boston. (Martell Aligning.)

RINGS. (See Piston Rings.)

ROAD BUILDING MATERIALS.

Barrett Manufacturing Co., New York. (Tarvla.)

ROLLER BEARINGS.

Hyatt Roller Bearing Co., Detroit. (Hyatt.)

Norma Co. of America, 1790 Broadway, New York City. (Norma.)

SEATS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Racing.)

SEAT COVERS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SELF-STARTERS. (See Motor Starters.)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Sager Peerless.)

Hartford Suspension Co., 147 Morgan St., Jersey City, N. J.

Oxygen Generator Co., 301 River St., Troy, N. Y.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SPARK PLUG CASES.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SPARK PLUGS AND IGNITERS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)

Bosch Magneto Co., 223-225 W. 46th St., New York.

Heinze Electric Co., Lowell, Mass. (Heco Priming.)

Milwaukee Auto Specialty Co., 705-711 Chestnut St., Milwaukee, Wis. (Centerfire.)

Splitdorf Electrical Co., 98 Warren St., Newark, N. J.

Stonebridge Sales Co., 10 Wall St., New York, N. Y.

SPRINGS FOR AUTOMOBILE SUSPENSION.

Marburg Bros., Inc., 1790 Broadway, New York. (Marburg-Hagen.)

Tuthill Spring Co., 756 Polk St., Chicago. (Titanic Unbreakable.)

SPROCKETS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

TEST CLIPS.

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Universal.)

THERMOS CASES.

Dover Stamping & Manufacturing Co., Cambridge, Mass.

TIMERS.

Motor Specialties Co., Waltham, Mass. (Bemus.)

TIME STAMPS.

Hoggson & Co., S. H., Thames Bldg., New York, N. Y.

TIRE ACCESSORIES.

Braender Rubber & Tire Co., Rutherford, N. J.

TIRE CHAIN GRIPS. (See Chains.)

TIRE PRESERVATIVES AND PROTECTORS.

Braender Rubber & Tire Co., Rutherford, N. J.

TIRE REPAIR EQUIPMENT.

Stevens & Co., 373 Broadway, New York City. (Sampson Inner Tube Plug and Outfits.)

TIRES, CASINGS AND INNER TUBES.

Braender Rubber & Tire Co., Rutherford, N. J. (Braender.)

Federal Rubber Mfg. Co., Milwaukee, Wis. (Federal.)

Goodyear Tire & Rubber Co., Madison St., Akron, O.

Miller Rubber Co., Akron, O. (Miller.)

Polack Tyre & Rubber Co., 246 W. 59th St., New York City. (Polack.)

TOPS AND ATTACHMENTS.

Highland Body Manufacturing Co., Station P, Cincinnati, O. (Highland Coupe.)

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

TRANSFORMERS.

Packard Electric Co., The, Warren, O.

TRUCKS AND TRACTORS. (See Cars, Commercial.)

UNLOADERS.

Gallon Iron Works and Mfg. Co., 116 East Main St., Gallon, O. (Gallon Eclipse Portable.)

VALVE LIFTERS AND RESEATERS.

Paro, H. G., Suite 718-719 Michigan Blvd., Bldg., 30 No. Michigan Blvd., Chicago.

VALVE TOOLS.

American Valve Tool Co., 589 Hudson St., New York, N. Y.

VULCANIZERS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)

Vanderpool Co., Springfield, O.

Williams Foundry & Machine Co., Akron, O.

WELDING OUTFITS.

Dyer Apparatus Co., Cambridge, Mass. (Dyer.)

Waterhouse Welding Co., 3 Pelham St., Boston, Mass.

WHEELS, WIRE.

Houk Mfg. Co., 1709 Elmwood Ave., Buffalo, N. Y. (Houk Detachable.)

WRENCHES AND COMBINATION OUTFITS.

Coes Wrench Co., Worcester, Mass.

Lane, Will B., 180 No. Dearborn St., Chicago. (Unique Ratchet.)

Mossberg Co., Frank, Attleboro, Mass.

Walden Mfg. Co., 73 Commercial St., Worcester, Mass.

NEW YORK

CHICAGO

BOSTON

DETROIT.

Subscriptions:

The United States and Mexico,
\$1.50 a year; Canada and For-
eign Countries in Postal
Union, \$2.00 a year.
Ten cents a copy.

THE AUTOMOBILE JOURNAL

Remittances:

Should be made by Check, Draft,
Postoffice or Express Money
Order, or Registered Letter.
Money enclosures must
be at sender's risk.

William H. Black, Treasurer.

AUTOMOBILE JOURNAL PUB. CO.

Published the 10th and
25th of Each Month.

D. O. Black, Jr., Secretary.

Times Building, Pawtucket, R. I.

Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under Act of Congress of March 3, 1879.

VOL. XXXIX.

MAY 10, 1915.

No. 7.

PUBLISHER'S AND READERS' PAGE.

THE Next Issue of the *Automobile Journal*, the issue of May 25, will be the International Sweepstakes Number. It will bring to the reader the news of the Indianapolis race just prior to the start, and will give authentic and interesting descriptions and illustrations of the racers, their cars, an authoritative analysis of previous meets, and shrewd prognostications as to the probable winners. This meet promises to be the biggest ever held in the middle west, 41 drivers having registered with the racing officials on the day that the entry lists were closed.

The Touring Season of 1915 already promises to be the greatest ever witnessed in this country, and the Annual Touring Number of this publication will be proportionately greater than that of last year. The touring number issue of July 10 will be fully worth a year's subscription to the *Automobile Journal*, it containing a great volume of absolutely accurate road and route information that can be obtained in no other way except at a considerable expense. The automobile and touring clubs and associations throughout the country are extending their co-operation to make this number the most complete and accurate ever published. Each section of the country will have representation, and each route will be splendidly illustrated with picturesque scenes and accurate maps.

As an Educational Feature the New Owners Department is one of the chief sections of the *Automobile Journal*. It is meeting the approbation and needs of thousands of car owners who are novitates in the operation, maintenance and minor repairs of their machines. Among the hundreds of hints that have already appeared and those that will be published in the succeeding issues, there is certain to be some that will save the new car owner considerable money, and, sometimes, serious accidents, through forestalling some break down that may have disastrous results. The suggestions in this department are all extremely practical, economical and always stated in terminology simple to understand. The publisher calls the

attention of the new car owner to the series of instruction books published by this company. While they are devoid of technicalities, they deal with every subject involving a pleasure car or commercial vehicle, considering every standard type and recognized construction, so that the reader can take up precisely what he has for components or equipment instead of the mere application of principles. Regarded as the

best works treating of motor vehicles, they have been adopted as text books in a large number of schools and colleges. Every subject pertaining to automobiles and trucks is fully treated in text and illustrations, and the series is revised annually, indexed and cross-indexed, and brought up to the minute. Detailed information regarding the books, which can be obtained singly or in series, will be sent to inquirers.

There Is No More Valuable Information for the owners of Ford cars than is contained in the Ford Department of this magazine. The fundamental principles of operation of the car are thoroughly explained as are the suggestions as to the economical use of the car. Every car operator desires to reduce operation cost to the minimum, and by consulting this department he will be greatly aided in his effort. Every driver is also interested in the latest products of the accessory and equipment manufacturers, and for that reason the editor has incorporated, as a regular feature, the latest and best devices on the market, with full analytical description, illustrations, price and address of the maker. This department is a common meeting ground for the owner and the maker, and as such is more than justifying its existence.

The best and latest accessories and equipments on the market are described and illustrated in another department of the magazine, in addition to those devoted exclusively to the Ford cars. While the reader may be familiar with some of them as they appear in advertisements he cannot obtain such complete descriptions by practical automobile men as here.

Partial Table of Contents.

	Page
*Millions to Be Spent on Pennsylvania Roads	17
*Automobile Racers and Events	23
*Interesting Exhibits at 'Frisco	26
*The Motor Car in Foreign Lands	28
*General News of the Industry	31
*The New National "Newport" Six	35
*First Motor Newspaper Delivery	39
*Practical Motor Car Repairs	42
*Many Prisoners Work on Roads	47
*Great Interest Shown in "Jitneys"	50
*Industrial Happenings and Comment	52
*Trucks Driven by Internal Gear	53
*New Accessories and Equipment	55
*New Equipment for the Garage	57
*Suggestions for the Ford Car Owner	59
*Ford Car Accessories and Equipment	63
*Practical Facts for New Car Owners	66
*Readers' Queries and Suggestions to Owners	67

*Indicates article is illustrated.

What's the Answer to the Mileage Question?

But They Can't Answer Your Mileage Question Unless They're On Your Car.

SOME men try to answer this question by buying tires at a price. How can they get mileage out of a tire that price prohibits the builder putting into it? Others endeavor to answer it by dickering for adjustments—and that is all they get. Others accept the factory equipment tires on their cars as the solution to the mileage question. But the car builder neither makes nor guarantees tires.

This mileage question is never settled until it is answered right. You can only get as many miles out of a tire as the manufacturer puts into it.

Miller Builds Mileage In For You

by first making a shock-resisting back bone of cotton fabric. And do you know that fabric is just as important as rubber in a tire? In fact, while rubber is necessary for resiliency, its greater function is to protect the fabric. The Miller method, which gives you the right rubber (and plenty of it) goes farther. It produces the right kind of fabric and that's what makes Miller Tires go farther!

The Miller Method is an exclusive process of vulcanizing with a low degree of heat—applied for a short time.

It retains the natural wax and oil in the cotton fibre.

This prevents internal friction, because it leaves nature's lubricant in the minute strands and fibre of the cotton.

This wax and oil carbonize at 240 degrees, but the old method requires 287 degrees to vulcanize the tire. A brittle and lifeless fabric cannot stand the terrific punishment that all tires must endure.

The process by which Miller tires are built, thoroughly vulcanizes, makes a perfect unit of rubber and fabric, without burning the life out of either, and with no point of cleavage in the construction.

This method of vulcanization—the retention of the vegetable wax and oil—means life in the fabric and rubber. It results in safety, freedom from blow-outs, and additional miles of wear in Miller tires, as thousands and thousands of motorists have found out.

Settle this mileage question today by going to the Miller dealer. When he puts Miller tires on your car, you can put the mileage question out of your mind for good.

The Miller Rubber Co.
Distributors in Principal Cities. **AKRON, U. S. A.**

WAX AND OIL IN THE COTTON MEAN MILES ON THE ROAD

Geared to the Road

(When Writing to Advertisers Please Mention The Automobile Journal.)

NASSAU



YOU can always depend on one NASSAU tire being just as good as another. NASSAU quality never varies. Every NASSAU is an achievement. Each tire is a triumph in itself.

The speed kings are mighty competent judges of tires. They have to be. Their success and very lives depend upon the tires they use. They have found *through actual performance* in many long and dangerous races, that NASSAU TIRES endure terrific strain and abnormal wear better than any other tire made *regardless of reputation or price*.

The record of NASSAU TIRES during the past year is truly one of remarkable performances.

Everybody who saw Ralph De Palma win both the Cobe and Elgin Trophies at Elgin on one set of NASSAU TIRES will vouch for it.

Everybody who saw Bob Burman smashing all the world's dirt track records of from 10 to 100 miles on NASSAU TIRES will tell you so.

Everybody who saw Dario Resta at the Panama Exposition win the 400-mile Grand Prix Race and a week later win the 300-mile Vanderbilt Cup Race, using the same identical tires in both—NASSAU STOCK TIRES, mind you—will tell you that such a performance has never been equalled in all the history of tiredom.

For it is a truly remarkable thing for a tire to go through even one long race without mishap—

But it is little short of phenomenal for the same tires to go through *two big long distance races* without mishap and still be in good condition.

No other tires have ever equalled such performances—and actual performance is tangible evidence of a tire's worth.

You will do well to equip your car with NASSAU TIRES. Make your choice *the choice of those who know*.

Get acquainted with the NASSAU DEALER in your town. You will find him a good man to do business with and he is waiting now to serve you.

The
CHOICE
of those
WHO KNOW



Thermoid Rubber Company

Factories and Main Offices: Trenton, N. J.

BRANCHES:

Chicago,	Philadelphia,	Pittsburgh,	St. Louis,
Indianapolis,	Detroit,	San Francisco	
London	Berlin,	Paris	

(When Writing to Advertisers Please Mention The Automobile Journal.)



Millions to Be Spent on Pennsylvania Roads

THERE are few states in the union which have as many fine highways as Pennsylvania, leading through a country so rich in historic and scenic interests. An active and well developed good roads movement has already accomplished many splendid betterments, although it has been beset at times by great financial and political difficulties.

These seem now to be in a fair way to be overcome. Senator Sproul, chairman of the finance committee of the state senate and a power in the state, has introduced a bill appropriating \$8,500,000 for use on the roads during the next two years.

This bill is said to be favorably regarded by Governor Brumbagh. To increase confidence in the administration of the State Highways Department he has appointed Robert J. Cunningham of Pittsburg commissioner and has announced that he will form a highway council consisting of the governor, Commissioner Cunningham and Chief Highways Engineer Uhler, which will go over every detail of the administration of the department with a particular view to securing the greatest efficiency from the appropriation and preventing criticism of the de-

partment on the ground of waste and loose methods of expenditure which have beset it in the past.

Of the large amount mentioned in the bill \$6,000,000 is specifically appropriated for use on the state highways. This will provide \$300 a mile a year, which will not only make it possible to put the present roads in the finest condition, but permit much permanent construction to be done.

For the purchase of toll roads and their conversion into state highways the bill provides \$500,000. The removal of these private roads will be a long step in advance, as there are still many of them operating in Pennsylvania. A million dollars is also set aside for the purposes of state aid in the construction of highways by the smaller political units.

One of the first accomplishments of the good roads movement in Pennsylvania was to bring about the organization of a highway department on the most modern and approved lines. It has secured the passage of much excellent legislation according to which future roads construction will be carried out.

During recent years, however, progress has



Washington's Headquarters at Valley Forge.

been delayed by inability to get from the legislature satisfactory appropriations to bring about the realization of the plans that have been laid down.

With its mountains and rivers, and its places made famous by many crises in the nation's history, Pennsylvania offers the tourist more than most states and it is to the interest of every motorist that these historical and scenic treasures should be made as accessible as possible.

State Controls Construction.

In Pennsylvania, as elsewhere, the first and most important step in road progress has been to remove the important roads from township and county control and place them under state supervision. In 1911 an act removed nearly 9000 miles of roads connecting the more populous centres and the county seats to state control.

Many of these roads are turnpikes, built originally along the routes of the old Indian trails. They are now completely under state control, and are maintained at the expense of the entire commonwealth. To extend the benefits of the greater

knowledge and skill possessed by the state highways department to other roads, the same act provided that other roads built by the smaller political units might be paid for in part by the state if they came up to certain definite standards.

In 1913 the legislature added 75,000 miles of roads formerly under the jurisdiction of the townships to the state highway system and placed before the voters a \$50,000,000 bond issue to improve them. This, however, failed of passage. Opinion in favor of road improvement has since then grown rapidly and there is a likelihood that some such provision may

be successfully put through in the not distant future.

In the meantime the state enjoys a very creditable system of main highways, ranging from fair to excellent, which connect the cities with the points of greatest interest throughout the commonwealth. Such is the road from Philadelphia to the Delaware Water Gap, one of the scenic beauties of the state.

One favorite route over which the trip is made starts along the Bethlehem pike north from Chestnut Hill, a suburb of Philadelphia, over a good stone road to Springhouse. At this point a toll road begins which runs to Souderton. Another toll road takes the tourist to Sellsboro through Quakertown. From there is a stretch of stone pavement to South Allentown, and thence through Nazareth and Easton to Martins Creek, on the Delaware, and Penn Argyle. There is a hard shale road from Argyle to Portland and from there to the Delaware Water Gap.

Two other routes to Delaware Water Gap are available. The mileage for all of them is



The Kittanny Mountains at Delaware Water Gap.

around 85 miles. One of them follows the route already given north from Chestnut Hill through Sellersville and Quakertown, but turns into South Bethlehem instead of Allentown. Thence it runs north through Nazareth, and instead of turning back to Easton to run along the river, goes across country through Cherry Hill, Wind Gap, Saylorsburg to Water Gap.

Another variation, good when the dirt roads are dry, leaves Philadelphia through Branchtown, Pittville, Castle, Edge Hill, Fitzwater-town, Dreshertown, Jarretown, Eureka, Chalfonte and Sellersville. From that point it follows either of the two routes already given.

A trip over the Lincoln highway as it traverses the length of the state is another undertaking which will well repay any tourist. The highway leaves Philadelphia toward the west and runs over a toll road to Paoli, a suburb. From Paoli a short side trip may be made to a house built by General "Mad Anthony" Wayne, whose battles with the Indians in the middle west form one of the high spots in the school boy's history.

Westward from Paoli on the highway is Malvern, and a short detour at that point brings the traveller to the scene of the Paoli massacre. Thence westward to Lancaster the road follows the Lancaster pike, which before the modern era of road improvement was for many years one of the finest roads in the United States and is still in splendid condition. It is surfaced with stone.

Near Lancaster the pike becomes a toll road and continues as such to York, and beyond that to New Oxford. Near Gettysburg a stretch of modern road built by the highways commission begins and carries the tourists into the battlefield where Generals Meade and Lee fought their memorable battle.

North from Harrisburg.

From Gettysburg, if the tourist desires to leave the Lincoln highway, excellent roads are available going and coming by different routes to Harrisburg, the state capital. There is a good dirt road north to Heidelsburg, York Springs, Dillsburg and Shepards town and thence into Harrisburg, where the object of chief interest is the Pennsylvania state capitol.

From Harrisburg on the return a road may be taken to Carlisle, the seat of the famous Indian school. From there a good stone road leads

to Mount Holly and over a short stretch of dirt to Bendersville, whence an improved modern highway leads into Gettysburg again.

From Gettysburg west the Lincoln highway runs over an excellent stone road to Chambersburg, Ford Loudon, McConnellsburg and Green Hill, where a shale road begins which extends to the Bedford county line. The finest type of modern highway runs across Bedford county, passing through Bedford, the county seat.

Here a short stretch of dirt road is encountered and then an improved highway begins which extends to the Allegheny county line through Greensburg, and from there to Pittsburg the road is all that could be desired. Thus it is possible to cross the entire State of Pennsylvania



One of the Many Pennsylvania Toll Gates.

on very fine roads all the way, even through the Allegheny mountains, where scenic beauty of rare quality is found.

Leaving the Lincoln highway at Gettysburg and continuing north from Harrisburg there are very excellent roads running north along the shore of the beautiful Susquehanna river to Clark's Ferry, and then northward again along the west shore of the river to Liverpool. A hard dirt road leads from Liverpool to Mifflinton and from Mifflinton one of the finest new highways in the state runs to Lewistown. This goes through Millerstown and along the banks of the Juniata river. This is a piece of construction very interesting to road builders, as many engineering difficulties had to be overcome before it could be completed.

From Lewistown a toll road leads westward to



River and Mountains in Eastern Pennsylvania.

Kiskacoquilla, from which point another new road leads through Mechanicsville and thence to Mill Creek. Here is an unimproved gap of about five miles and then new roads lead again from Huntingdon to Cresson by way of Water street and Hollidaysburg. The road runs from Cresson by way of Lilley and Portage to South Fork and Johnstown, made famous by a great flood. Thence it leads over improved state highways and a turnpike to Davidsville, striking the Lincoln highway again at Stoyestown.

Another route from Philadelphia to Harrisburg lies along a good stone road through Norristown, Pottsville and Reading, where a turn is made to the west along a stone road to Wernersville, which is noted for its sanitoriums. Here a turnpike begins which carries the tourist to Hummelstown through Lebanon along the picturesque Lebanon valley. From a point just west of Hummelstown there is an improved road into Harrisburg.

The Annual Route book of the Philadelphia Automobile Club supplies very complete touring information covering the state, Delaware, Maryland, New Jersey and parts of New York and New England. It is especially valuable for southeastern Pennsylvania. It contains numerous routes from Philadelphia to its suburbs.

One of the most interesting of these is the short run to Valley Forge, General Washington's

one time headquarters and a spot of great historical interest. Leaving city hall it goes out Broad to Spring Garden street, through Fairmount park, and out Ridge avenue to Wisahickon park, through Walnut lane, Barren Hill, Harmonville, Norristown, Jeffersonville, Port Kennedy to Valley Forge.

Another goes to Wilmington, Del., through Darby, Chester, Felton, Village Green, Chelsea, Booth Corner, Zebbley's Corner, Blue Ball to Wilmington.

Since 1911, when the Pennsylvania State Highways Department was reorganized, 500 miles of new road have been built throughout the state and in addition 150 miles of road have been resurfaced.

Money received by the state in payment for automobile licenses is turned over to the state highways department for repair purposes and has made it possible to go over about 10,000 miles of highways every year, cleaning them, removing loose stones, filling in ruts, clearing out culverts and ditches and placing them in first class condition. The state highways department employs at this work about 8000 men.

Recently the state legislature has had great difficulty in making the money at its disposal meet all of its requirements. In 1913 it appropriated \$26,000,000 more than it was permitted to spend, and it became necessary for the governor to cut its appropriations heavily. The funds set aside for road improvement were greatly reduced



In the Allegheny Mountains.



Along the Pennypack River.

on that account. This was substantially the situation in 1914.

Efforts to pass satisfactory bond issues for road improvement have been defeated by the

farmers, who were led to believe that the improvements were too largely for the benefit of automobilists and visiting tourists.

Roads that it has been possible to build with the limited appropriations secured have, however, greatly improved the conditions of the farmers in the territory which they serve. They have cut the cost of hauling products to market and reduced the necessary time.

In addition to that the more prosperous farmers are beginning to be large users of automobiles themselves and the thousands of light cars that are being placed in the rural districts of the state have aided materially in changing the rural view of road improvement.

There is every indication that the state highway department, under the direction of men in whom the public has confidence, will receive much more liberal support in legislative appropriations than it has during the past few years.

MILEAGES OF INTERESTING PENNSYLVANIA ROUTES.

Philadelphia to Delaware Water Gap (via Chalfonte), 85.2 Miles.

	Miles to	Total Miles	
		Out	Return
Philadelphia	0.0	0.0	85.2
Branchtown	6.7	6.7	78.5
Pittville	1.0	7.7	77.5
Castle	2.4	10.1	75.1
Edge Hill	1.2	11.3	73.9
Fitzwatertown	1.4	12.7	72.5
Dreshertown	1.1	13.8	71.4
Jarretstown	1.1	14.9	70.3
Eureka	6.4	21.3	63.9
Chalfonte	3.1	24.4	60.8
Sellersville	7.9	32.3	52.9
Delaware Gap	52.9	85.2	0.0

Philadelphia to Valley Forge, 27.7 Miles.

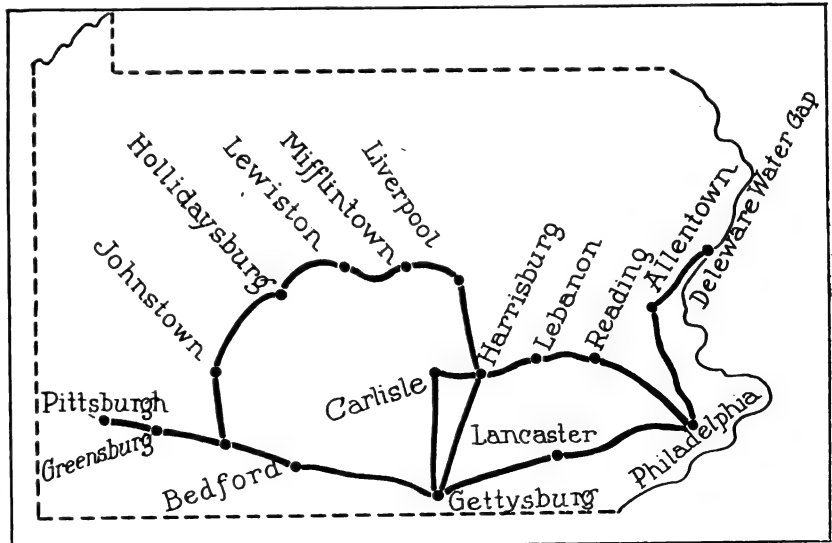
	Miles to	Total Miles	
		Out	Return
Philadelphia	0.0	0.0	27.7
Lincoln Drive	8.5	8.5	19.2
Barren Hill	5.5	14.0	13.7
Norristown	5.4	19.4	8.3
Port Kennedy	5.0	25.3	2.4

Valley Forge.... 2.4 27.7 0.0 Philadelphia to Wilmington, 31.2 Miles.

	Miles to	Total Miles	
		Out	Return
Philadelphia	0.0	0.0	31.2
Darby	7.0	7.0	24.2
Chester	6.0	13.0	18.2
Village Green	6.1	19.1	12.1

Philadelphia to Harrisburg (via Reading), 108.3 Miles.

	Miles to	Total Miles	
		Out	Return
Philadelphia	0.0	0.0	108.3
Wissahickon	6.3	6.3	102.0
Norristown	10.8	17.1	91.2
Jeffersonville	2.4	19.5	88.8
Collegeville	5.5	25.0	83.3
Trappe	1.9	26.9	81.4
Limerick	3.4	30.3	78.0
Sanatoga	3.7	34.0	74.3
Pottstown	2.9	36.9	71.4
Douglasville	4.8	41.7	66.6
Baumtown	4.8	46.5	61.8
Reading	8.4	54.9	53.4
Sinking Spring	4.9	59.8	48.5
Lebanon	22.9	82.7	25.6
Hummelstown	16.1	98.8	9.5
Harrisburg	9.5	108.3	0.0



Map of Leading Routes.

Chelsea	2.4	21.5	9.7
Blue Ball	7.3	29.8	2.4
Wilmington	2.4	31.2	0.0
Philadelphia to Water Gap (via Bethlehem), 85.9 Miles.			

	Miles to	Total Miles	Out Return
Philadelphia	0.0	0.0	85.9
Branchtown	6.7	6.7	79.2
Chestnut Hill	4.0	10.7	75.2
Springside	8.0	18.7	67.2
Sellersville	14.3	33.0	52.9
South Bethlehem	19.3	52.3	33.6
Nazareth	10.5	62.8	23.1
Saylorsburg	12.0	74.8	11.1
Delaware Water Gap	11.1	85.9	0.0

Harrisburg to Hollidaysburg,
129.7 Miles.

	Miles to	Total Miles	Out Return
Harrisburg	0.0	0.0	129.7
Clarks Ferry	14.5	14.5	115.2
Millertown	17.8	32.3	97.4
Mifflintown	15.1	47.4	82.3
Lewistown	12.1	59.5	70.2
Huntingdon	37.4	96.9	32.8
Williamsburg	19.8	116.7	13.0
Hollidaysburg	13.0	129.7	0.0

Harrisburg to Carlisle, 17.4
Miles.

	Miles to	Total Miles	Out Return
Harrisburg	0.0	0.0	17.4
Camp Hill	2.3	2.3	15.1
Carlisle	15.1	17.4	0.0

Carlisle to Gettysburg, 27.6
Miles.

	Miles to	Total Miles	Out Return
Carlisle	0.0	0.0	27.6
Mt. Holly Springs	6.0	6.0	21.6

Gardener's Station	7.8	13.8	13.8
Benderville	3.9	17.7	9.9
Gettysburg	9.9	27.6	0.0

Gettysburg to Harrisburg, 37.6
Miles.

	Miles to	Total Miles	Out Return
Gettysburg	0.0	0.0	37.6
Heldersburg	9.9	9.9	27.7
York Springs	4.6	14.5	23.1
Dillsburg	8.9	23.4	14.3
Shepherdstown	5.4	28.8	8.9
White Hill Station	6.3	35.1	2.5
Harrisburg	2.5	37.6	0.0

Philadelphia-Gettysburg, 118.7
Miles.

	Miles to	Total Miles	Out Return
Philadelphia	0.0	0.0	118.7
Ardmore	9.4	9.4	109.3
Bryn Mawr	2.1	11.5	107.2
Wayne	3.9	15.4	103.3
Devon	1.5	16.9	101.8
Berwyn	1.4	18.3	100.4
Dalesford	1.2	19.5	99.2
Paoli	1.2	20.7	98.0
Malvern	1.5	22.2	96.5
Whitford	7.4	29.6	89.1
Downington	3.3	32.9	85.8
Coatesville	6.6	39.5	79.2
Ladsburyville	3.9	43.4	75.3
Strasburg	10.2	53.6	65.1
Paradise	2.7	56.3	62.4
Lancaster	9.6	65.9	52.8
Columbia	10.2	76.1	42.6
Wrightsville	1.9	78.0	40.7
York	11.8	89.8	28.9
Thomasville	7.1	96.9	21.8
Abbottstown	7.7	104.6	14.1
New Oxford	4.2	108.8	9.9
Gettysburg	9.9	118.7	0.0

Gettysburg-Bedford, 80.1
Miles.

	Miles to	Total Miles	Out Return
Gettysburg	0.0	0.0	80.1
Seven Stars	3.9	3.9	76.2
McKnightstown	1.9	5.8	74.3
Cashtown	1.9	7.7	72.4
Fayetteville	11.4	19.1	61.0
Chambersburg	5.5	24.6	55.5
St. Thomas	7.4	32.0	48.1
Fort London	6.0	38.0	42.1
McConnellsburg	8.1	46.1	34.0
Harrisonville	6.4	52.5	27.6
Breesewood	11.4	63.9	16.2
Everett	8.4	72.3	7.8
Mt. Dallas	1.1	73.4	6.7
Bedford	0.7	80.1	0.0

Bedford to Pittsburg, 100
Miles.

	Miles to	Total Miles	Out Return
Bedford	0.0	0.0	100.0
Wolfsburg	2.5	2.5	97.5
Schellsburg	6.9	9.4	90.6
Buckstown	13.5	22.9	77.1
Stoyestown	2.0	24.9	75.1
Jenners	10.7	35.6	64.4
Jennerstown	1.0	36.6	63.4
Laughlinstown	8.8	45.4	54.6
Ligonier	3.0	48.4	51.6
Youngstown	9.1	57.5	42.5
Greensburg	10.0	67.5	32.5
Grapeville	4.1	71.6	28.4
Adamsburg	2.3	73.9	26.1
Irwin	3.0	76.9	23.1
Jacksonville	1.2	78.1	21.9
Circleville	0.6	78.7	21.3
E. McKeesport	5.8	84.5	15.5
Wilmerding	1.5	86.0	14.0
Wilkinsburg	6.7	92.7	7.3
Pittsburg	7.3	100.0	0.0

GOOD ROADS DAY IN UTAH.

At the instance of the Rotary Club of Salt Lake City, Governor Spry has set aside a day for work on the roads. Practically all of the members of the Salt Lake Rotary Club will turn out with picks and shovels. They have challenged other commercial organizations in the state to compete with them in the number of workers sent out.

E. R. Morgan, state road engineer, has sent out a letter to the various counties urging them to get as many men onto the roads that day as possible. Most of the work will be done on the Lincoln Highway, over which very heavy traffic is expected to pass to the Pacific coast.

GOV. RALSTON BOOSTS HIGHWAY.

Governor Ralston of Indiana has agreed to be present at a great good roads meeting in Fort Wayne, Ind., about June 10, when the city will be photographed for the Lincoln Highway film which is being made. This film, when com-

plete, will be shown for several weeks at the exposition in San Francisco and will then be displayed in various cities about the country. Fort Wayne is delighted at getting into the highway movies.

ROAD CONGRESS IN SEPTEMBER.

At a recent meeting of the executive committee of the Pan-American Road Congress, held in New York City, it was decided to hold the next road congress in Oakland, Cal., Sept. 13. This will enable engineers who attend the International Engineering Congress to attend the road congress as well.

URGES MARKING RURAL ROADS.

Thomas J. Hay, dealer in Hupmobiles, Chicago, has been trying for a long time to get motorists interested in a movement to have rural roads all over the country marked for the benefit of travellers, with markers similar to those used on city streets.

AUTOMOBILE RACERS AND EVENTS.

"WILD BOB" BURMAN again demonstrated in the Southwest Sweepstakes at Oklahoma City, April 29, that he is one of the most daring racers in the country, if not the world. Contesting with 10 other dare-devil drivers, he rounded the two worst turns of the course, Willard hook and Rainbow curve, scarcely slackening the speed of his Peugeot machine, although the course was in sad condition from the series of rains that had caused the postponement of the event until a week after the original date.

RESULTS AT OKLAHOMA CITY.

Driver	Car	Time
Burman.....	Peugeot.....	2:56:00 3-5
Lewis.....	Stutz.....	2:57:00 1-5
Raimey.....	Case.....	3:05:41
Hearne.....	Case.....	3:08:02

Burman covered the 200-mile course in two hours and 56 minutes, averaging 67.98 miles an hour. On one lap he reached the speed of 72 miles an hour, and this despite the fact that from the seventh lap to the close of the race he was handicapped by a fragment of glass having lodged in one of his eyes. His reward was the \$2500 capital cash prize, and a great increase in his stock as a possible winner of the Indianapolis event, May 29.

Dave Lewis, in a Stutz, gave Burman a battle royal during the final 30 laps of the race, Lewis obtaining the lead after that lap, but having to give way to "Wild Bob," who gradually closed in on the Stutz driver after the 30th lap until he passed him in the 70th and held the lead during the following last 13 rounds of the course. Raimey, in the yellow Case, flashed to the front of the field at the beginning. During the first 25 rounds Carlson, in the Maxwell, led in elapsed time, with Disbrow in his Simplex fighting desperately. Because the understructure of his car, which was hung low, continuously came in contact with the torn up ground at the turns, Carlson was forced to discontinue in the 45th. It was then that Burman, who had been taking matters leisurely, suddenly shot out and began his spectacular race to victory.

Burman's car was equipped with Bosch magneto, Master carburetor and Nassau tires, and the three following cars were provided with the same makes of carburetors and magnetos. The \$5000 in prizes was distributed as follows: Burman, \$2500; Lewis, second, \$1250; Raimey, third,

\$700; and Hearne, fourth, \$500.

The stock car contest was won by an Overland roadster, which completed the run in very fast time without overheating. The only changes made in the car were to remove the fan and mount a smaller racing body. The radiator tank was not refilled during the race.

NEW SPEEDWAY GREAT SPORT ARENA.

A great future for the Sheepshead Bay speedway was predicted by Carl G. Fisher of Indianapolis, president of the new organization who recently visited

New York City to look over the plant and confer with General Manager Everard Thompson, the engineers and the New York bankers who are financing the undertaking. The magnitude of the plant, the excellent transportation facilities for getting large



Everard Thompson, General Manager of Sheepshead Bay Speedway.

crowds to and from the city, and the ample space provided for handling great crowds in a short time greatly impressed the head of the enterprise.

In planning the plant first consideration has been given to the safety and comfort of the public. "Safety first" is a very important consideration in a speedway for high speed motor contests. The grounds, when completed, will be developed into a beautiful park with privet hedges about it and great beds of rhododendrons.

It is the plan of Manager Thompson to use the speedway for many other purposes, in addition to motor racing, and it is probable that outdoor events of all kinds will be held there. While the speedway is built primarily for motor racing, the great interior oval, which measures 4000

feet in length and 1600 feet in width, will be developed into a great open-air contest ground. A portion of it will be used for football and baseball fields, tennis courts and a track where Olympic games can be held.

It is not possible to bring Yale, Harvard or Princeton to the speedway for football games, for they have an agreement to play only on their home grounds, but Manager Thompson expects to be able to secure other teams whose standing is high enough to attract the interest of the people of New York. It is possible that in the future army and navy games may be played there and the management will endeavor to give the arena a national standing by arranging games between the best teams of the East and West and North and South.

The grounds will be developed as an aeronautic field. At Hendon, England, there is a regular daily schedule of flying events, which is very largely patronized, and an attempt will be made to develop something similar at Sheepshead Bay.

In addition, it has been suggested that the grounds can be used for military reviews, pageants, open-air auto shows and even opera in the open could be given before the great stands. This year it will be necessary to devote all possible energy to the completion of the plant for a great motor race in October, and not until next year will the development of the speedway for other purposes be begun.

\$50,000 ROAD RACE.

The racing committee of the Panama-Pacific Exposition has proposed another auto racing classic, to be run over the same course as the Vanderbilt Cup and the Grand Prize contests at San Francisco in October. The purse offered is \$50,000, the largest ever given for an event of the kind. The race will be called the Grand American Sweepstakes and will be open to the drivers and cars of the world. No piston displacement limitation will be established and if the present plans, as announced by William L. Houghton, chairman of the racing committee, are carried out, much the same regulations will prevail as in the Grand Prize events.

CINCINNATI SPEEDWAY PLANS.

Plans for a speedway at Cincinnati with a 2½-mile track were discussed at the meeting of the Cincinnati Motor Speedway Company, at which E. W. Edwards was elected president of the

company, and Maurice Frieberg, James P. Orr, Andreas Burkhardt, J. J. Cooper, Harry Leyman and B. K. Le Blond were named as directors. The company has a capitalization of \$500,000.

Three sites of 400 acres each are at present under consideration for the motordrome. They are in the Reading, Newton and Sharon suburbs of Cincinnati. In addition to the track an aviation field, rifle ranges, polo grounds, military parade grounds, athletic field, etc., are proposed. The speedway is planned to become a member of a circuit which will include Indianapolis, Detroit, Chicago, Minneapolis.

GALESBURG ENTRIES NOW OPEN.

The officials of the Galesburg Fair Association have completed their final arrangements for the second annual automobile race, to be held June 9, according to E. A. Tate, secretary of the association. The distance of the race was first set at 200 miles, but after conferring with leading racers and racing officials it has been decided to cut this distance to 100 miles. The purse aggregates \$3000, divided among the winners as follows: First, \$1200; second, \$800; third, \$500; fourth, \$300; fifth, \$200. The sanction of the A. A. A. has been received and entry blanks are now being distributed among the possible racers. Last year's field included such stars as Burman, de Palma and Mulford, and it is expected that an even greater and equally distinguished field will start this year. Fred. J. Wagner has been selected as starter, and John G. DeLong, Chicago, as director of the contest.

NEW JERSEY RELIABILITY RUN.

The Light Car Association of America has sanctioned the second annual reliability run of the Light Car Club of New Jersey, which will run between Newark, N. J., and Atlantic City, May 30 and 31. C. G. Percival, president of the L. C. A. A., will referee and manage the contest. Official observers will accompany each car and will keep strict watch on all mechanical troubles, adjustments, gasoline and oil consumption. The distance is about 300 miles and silver cups will be awarded for cars making a perfect score, and additional cups for the lowest fuel consumption. But four cars made a perfect score last year. Among the cars already entered are included Trumbull, Scripps-Booth, a Coey-Bear, Saxon, Zip, Argo, Vixon, Woods and Maxwell. Entries close May 24 and applications should be addressed to Charles G. Percival, Teaneck, N. J.

YELLOWSTONE OPEN TO MOTORS.

After years of effort the American Automobile Association has received sympathetic hearing from Secretary Lane of the Interior Department, who has arranged that automobiles be admitted to Yellowstone park beginning Aug. 1. This is expected to greatly increase the traffic through the northwest and take many tourists to Seattle and Portland who have not previously been able to reach those cities.

Plans have been carefully made to control the use of the motor cars. They will leave the gates in groups in the morning and in the afternoon a half hour in advance of the stages that are operated through the park. All traffic will move in one direction around the park. Routes have been arranged which will make it possible for tourists to see all the wonders of the park. It is expected that the road through the park will become a part of the regular touring route through that part of the country.

Crossing the Sierra Nevadas from California, on the return journey, it will soon be possible to reach the park over the scenic Tioga road, which Secretary Lane has just accepted in behalf of the government. This was built in 1881 by capitalists to reach a mine which shortly afterwards was abandoned. Numerous efforts have been made to secure its use for the public, but they failed until Stephen T. Maher, one of Secretary Lane's assistants in the Interior Department, arranged to have a number of wealthy western men buy it by subscription and turn it over to the government.

TELEPHONES FOR DESERT TOURISTS.

A company has been formed and has begun the construction of a telephone line along the Midland trail, from Grand Junction to Salt Lake City, one of the most desolate and uninhabited reaches of country that is traversed by tourists. The line will be completed by June 1.

Connections for portable telephones will be placed every half mile along the line. On approaching this stretch of road the motorist may secure such a telephone by depositing an amount equal to its cost and at the other end of the line, on the return of the instrument, the sum will be refunded, minus a small rental. In case of a

break down, or trouble on the long stretch of desert, connection with civilization can be had instantly to call for help. The Grand Junction Chamber of Commerce is aiding in the project.

As another inducement to tourists to travel this way on their journey to the Pacific coast, arrangements are being made to have the road patrolled by a wagon fitted with equipment to clear the way wherever it may have become blocked along the deep arroyos through which it passes.

TANGO TEACHER IN HIS MARMON.

Vernon Castle, the man who has reached the summit in the terpsichorean art and is now one of the most widely known exponents of the modern dance, as well as being a star in the play, "Watch Your Step," is here seen driving a Marmion 41, his recent acquisition. With him is his



Vernon Castle Piloting His Marmion Roadster.

prize police dog, which is almost as well known in the police dog world as his master is at the dances.

INDIAN CHIEF HEADS TOURISTS.

With Chief Manitou, a full-blooded Indian, from the San Juan valley at its head, a large party of business men of Colorado Springs and Manitou has been making a tour through the middle west. They covered the Ocean-to-Ocean Pikes Peak highway to Indianapolis and returned to Colorado Springs by the National Old Trails road and the Lincoln highway. The tour was a good roads undertaking, directed by the Pikes Peak Ocean-to-Ocean Highway Association, the Colorado Springs Chamber of Commerce and the Manitou Commercial Club.

The Willys-Overland Company employs 12,000 men in its different plants.

INTERESTING EXHIBITS AT 'FRISCO.

A SUFFICIENT number of American manufacturers have installed exhibits at the San Francisco exposition to make that part of the Transportation building reserved for their use a very interesting place. Following the traditions established at auto shows, most of the manufacturers have shown only their completed models, stripped chassis with cross sections of mechanism and various parts. The displays are attractive and of large publicity value.

In view of the great recent development of the automobile industry and its tremendous influence on American life, the exposition author-

three hours. This shows to great advantage the Ford "chain" assembling system, and, as a completed car is turned out every 10 minutes, maintains the Ford tradition for rapid production.

A load of Ford parts is brought to the exposition grounds every night after 11 o'clock and they are laid out ready for assembling the next day. The frames are laid on a moving rail and are sent slowly past the 28 assemblers, each of whom has one operation to perform. A car is turned out complete every 10 minutes, from 2 o'clock to 5 o'clock. As soon as the car is finished it is driven to the Ford sales room.

One of the largest automobile exhibits at the fair is that of the Pacific KisselKar Company, under the direction of J. H. Eagle, which contains KisselKar passenger cars and trucks, Briscoe cars and Federal trucks. The total value of the cars shown comes to about \$30,000.

The Earl C. Anthony Company, Pacific distributors for Chalmers cars, displays several special cars done in light colors. Special chassis are also exhibited. The individual units in the display will be replaced several times during the life of the exposition. On the same floor is the low priced Grant "Six."

The Pierce-Arrow company has a large display, reaching over \$40,000 in value. The cars are the same that were shown

at the New York and Chicago shows and are done in special colors. One of the features of the display is a cast aluminum body.

The Buick exhibit is arranged to lay emphasis on the "valve-in-the-head" principle and to explain fully the advantages of this construction. The Edison storage battery is displayed in a novel way. Thousands of the batteries are shown and from them wires are run to provide brilliant illumination from the current drawn from the batteries. The Western Electric Company has also a complete exhibit of the various devices it makes. Oakland is well represented by its current models.

The first car sold at the exposition was a Jeffery. Three models, in red, white and blue, were



Interior of Transportation Building at the Exposition, Showing Decorative Scheme.

ities assigned large quarters to the automobile exhibits. As one of the most conspicuous results of the industry's growth has been the improvement of roads that idea has been developed in the decoration for that part of the building.

The highway improvement that has already been accomplished in the West is shown by a large panorama relief map. Other exhibits show the methods used to produce gasoline and lubricating oils. The motor truck is represented by an exhibit indicating its importance as a feeder of freight to the western railroads. There is a large exhibit of car and truck parts.

The Ford company has installed in the exposition a miniature assembling plant, where 28 men work every afternoon, assembling 18 cars in

secured. Lieut. Ellis, an officer at the Alcatraz Island station, tried one of them over the Grand Prize course and bought it at once. The Jeffery will place on display before the exposition is over a large Jeffery "Quad" armored and with a turret containing rapid fire guns.

Studebaker has a full line of models, a stripped chassis and an engine arranged to show all of its working parts. Overland shows open and closed cars, a racy type roadster, stripped chassis and many parts. This exhibit is next to the space taken by the railroad car companies. Packard and Cadillac have handsome displays of all the cars they now produce, chassis and parts. White is represented by both cars and trucks.

MOTOR TRAINS AT EXPOSITION.

Seventeen Ford motor engines are used in the transportation system established to haul visitors about the exposition grounds in San Francisco. They pull 17 small motor trains which run from Machinery hall to the Massachusetts building and back, a distance of three miles.

These trains were designed and built by R. B. Fageol of Oakland. Power is supplied by small tractors, which have 36-inch tread and a wheelbase in proportion. Each one carries a Ford motor. The steering wheel is set like the usual automobile steering post, and a single seat for the driver is provided on the tractor. An inter-steering arrangement has been perfected so that by the use of a ball and socket draw bar each car steers the one that immediately follows. Brake shoes work against the surface of the pavement instead of against a drum on the cars themselves. The trains are operated with perfect safety among the largest crowds that visit the exposition.

Around the grounds the trains run at an average speed of 10 miles per hour, although the tractors running empty are said to be able to make 20 miles an hour. The cars, two of which make a train, are like long settees placed back to back with a passage way between in which the conductor operates. The wheels have five by 25 solid tires and are completely hidden.

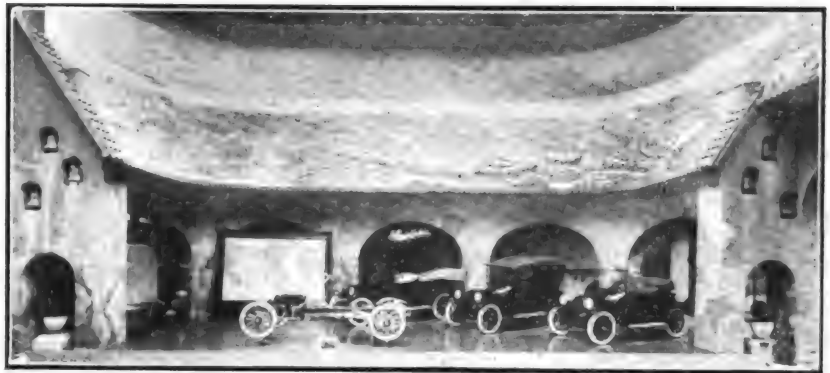
The cars are very low, so that it is only a short step off the ground to a seat. This feature does much to make the conveyance popular.

Each of the trains is travelling about 100 miles per day, at a cost of five cents for fuel, wages for the crew, and mechanical upkeep and depreciation. The fare charged is 10 cents. Twenty passengers per train is a good load, but on some days, when the crowds have been especially large, as many as 50 have been carried. Sixty-five men are employed in operating the system.

2,500,000 CARS BY JANUARY 1?

Although there are only about 600,000 automobiles in all the world outside of the United States, the Scientific American predicts that by the first of next year there will be 2,500,000 in operation in this country.

Registrations, as nearly as they could be figured on Feb. 1, showed 1,900,000 automobiles in use. For 13 months the increase has gone on



Panorama Relief Map of Western Highway Improvements as Decorative Feature at Exposition.

at a rate of not less than 600,000 per year, and each month has shown an increase over the last. If this continues, at the present rate the 2,500,000 mark will be reached, it is estimated, some time early in January, 1916.

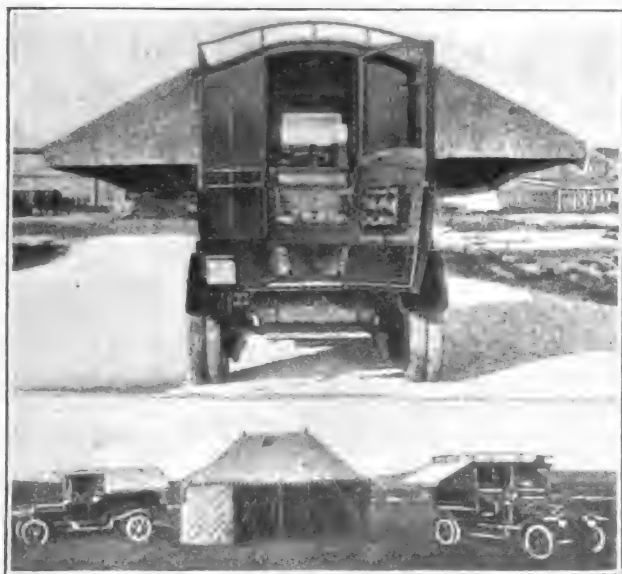
Registrations for 1914 were 700,000 greater than for 1913. Taxes and license fees paid on these cars amounted to \$11,925,295.56. Of this amount New York owners paid \$1,527,396.36; California, \$1,338,424.50, and Pennsylvania, \$1,184,675. No other states reached the million mark.

The annual election of the St. Louis Automobile Dealers' and Manufacturers' Association resulted as follows: President, Samuel Breardon; vice president, John H. Phillips; treasurer, Joseph H. Schlect; directors, W. C. Anderson, T. L. Hausmann, H. B. Krenning, J. D. Perry Lewis, R. L. McCrea and Milton B. Strauss.

THE MOTOR CAR IN FOREIGN LANDS.

WHEN the Czar of the Russians visits the front to observe his troops his food is prepared in a special motor field kitchen, designed and built for his personal use. This, and the car in which the attendants travel, are both mounted on 50-horsepower Mercedes chassis.

The accompanying vehicle has glass windows all around, but the kitchen car has the appearance of a closed omnibus. The front portions of the side walls of the kitchen are hinged flaps, which when let down to a horizontal position are used as auxiliary tables. There is a seat just inside the car at the rear. The side walls are oc-



Motor Field Kitchen and Travel Car in Which Czar Visits the Front.

cupied by numerous cooking utensils. At the end of the car are the boiler and the five alcohol burners. Beneath this are refrigerators for meat, butter and wine. Above the windows are two large drawers, containing sufficient of the imperial plate to serve 12 people.

At the forward end of the roof is a water tank and above the conductor's seat is a large wash basin of the folding type. The kitchen vehicle carries a large tent and 10 folding chairs.

LONDON 'BUS TRAFFIC HEAVY.

Statistics on travel in London during the Easter holidays show that although London 'bus service has been much reduced by the commandeering of the 'busses for military purposes,

those available were used to the limit of their capacity. With a large part of the population they are much more popular than the subway or street cars.

On Easter Monday the 'busses carried 2,000,000 passengers. Special lines to resorts outside the city carried pleasure seekers to the number of 30,000, 12,000, 7500 and 4500 on different runs.

In Edinburgh, which has municipal street railways, a controversy is on among city officials as to whether it is better to build more railways or to use motor 'busses. These are very popular and have the great advantage of not requiring a large fixed investment, which may become useless if lines of travel are changed.

REPAIRS BIG MILITARY PROBLEM.

The tremendous difficulties involved in keeping the great fleets of motor trucks used for war purposes in Europe in constant repair has made it necessary to standardize the "convoys" as far as possible. That is to say, the trucks hauling supplies from each base to the same division of the army are as nearly as possible of one make and model.

This makes it possible to equip the field repair shops which serve that convoy with a stock of repair parts. In the case of large mixed fleets the question of parts is overwhelming, owing to the enormous number and the variety that would have to be stocked.

English truck experts point out that the only advantage that the military repair shops have over the commercial shops is the fact that they do not have to regard economy, but can take any course that will save time and keep the efficiency of the vehicles at the highest point.

It is urged that so far as possible obsolete models of trucks should be retired from the military service even though they may still be in condition for efficient work. The reason given for this is that most of the makers who produced these old trucks are now engaged in producing new ones for the government as fast as they can drive their factories. If obsolete models are used and a demand arises for extra parts, it is necessary to interrupt the work on new models in important departments in order to turn out obsolete parts. Thus in order to keep old trucks in service the government interferes with its own supply of new trucks.

As the war continues it is the aim to standardize the fleets as far as possible on the basis of the current product of the truck manufacturer.

BRITISH NAVAL SEARCHLIGHT.

For the use of the British navy on shore, the Austin Motor Company, Birmingham, England, has built a motor driven searchlight, which has some distinctive features. In order to make it possible to use the light in places where a truck is unable to penetrate, the light is mounted on a car, which can be lifted from the truck chassis, and pulled by hand. This car is connected with the truck by a long electric cable.

The chassis used is a standard Austin two-thirds-ton truck. The electric generating plant was designed and built by the Austin company. It consists of a dynamo which, turning at 1000 revolutions a minute, will produce 120 amperes at 80 volts. A long line of cable is carried on a reel. The dynamo is driven by an Austin two-cylinder, 12-horsepower gasoline engine mounted in the truck body. This is fitted with a specially designed cooling system and an exhaust silencing chamber.

The searchlight is mounted on a hand-drawn car with four wheels, fitted with pneumatic tires. The rear wheels of this small car are fitted with brakes operated by a lever at the rear of the chassis. This makes it possible to prevent the car running over its crew on a down grade.

The great light, 24 inches in diameter, is mounted on a swivelled base, and is moved up and down or sidewise by worm gears. The seat on which the operator sits is so mounted that it turns with the light. Tracks are provided on which the small car is pulled onto the truck, or run off.

The generating unit may be used to supply light for officers' quarters, or for field hospitals if desired.

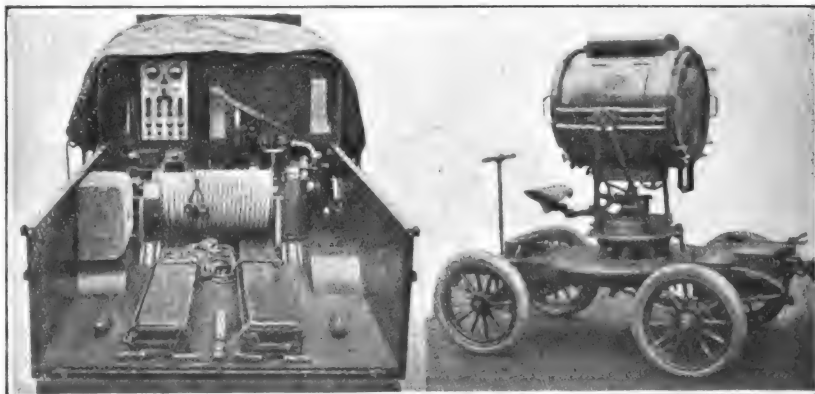
MANY HUPMOBILES IN THE WAR.

The armies engaged in the European war are using about 10,000 American cars, and among these the Hupmobile is largely represented. John L. Poole, European export manager for the Hup Motor Car Company, reports from Paris that 500

of those cars are being used by the Germans and the Allies. Nearly every private Hupmobile in Europe was commandeered at the outbreak of hostilities. At Tsing-Tau, when the Japanese were fighting the Germans, the Japs used a fleet of Hupps. Recently 50 Hupmobiles were shipped to Praetoria, South Africa, for military purposes. In France a large number are in use by the aviation corps.

SEVILLE ADOPTS THE MOTOR CAR.

Sleepy old Seville, in Spain, is beginning to adopt the motor car. The roads about the city are not kept in good condition and such cars as there are remain almost entirely in the city. There are still many horses and carriages in use. It is only during the past few years that cars have been used there, and although there are



British Naval Searchlight Mounted on Motor Chassis.

170,000 people in the city, only 100 new cars were acquired in 1914. In all there are 366 in town. French cars are most popular because they are the best known, can be secured in the shortest time and repair parts are conveniently available. Nearly every owner has a chauffeur, who receives \$30 a month and out of that pays for his own clothes, food and lodging.

Five KisselKars were purchased by the Panama-Pacific Exposition authorities, four of which are in use by the commissary department, the fifth being assigned to the financial department.

A school has been established in Honduras under the auspices of the government for the instruction in theory and in practise of embryo chauffeurs.

TIRES UNDER NOVEL TEST.

A novel endurance test for tires is being conducted by the Dreadnaught Tire and Rubber Company, Baltimore, Md. A Lancia car, equipped with a prairie schooner top and Dreadnaught tires, left New York City for San Francisco recently on the first leg of a 10,000-mile journey to demonstrate the enduring powers of the tires. The accompanying illustration gives an idea of the car at the start. The interior is arranged somewhat like a Pullman sleeping car, the berth being suspended from the roof, which leaves sufficient space above for a long rack, in which is carried the light weight baggage. The occupants have sleeping quarters within the car.



Testing Dreadnaught Tires on Transcontinental Run and Return.

It is frankly a method of advertising the values of Dreadnaught tires, and the manufacturers of the other equipment of the car have taken the opportunity to call attention to their products by displaying advertisements. At the start a committee inspected and marked the tires, and the same men will examine them on the return of the car and make public their findings. As Dreadnaught tires are guaranteed for 7500 miles, it is expected that the run will be completed on the original casings.

NEW YORK ORPHANS ON TOUR.

The 11th annual outing for New York City's orphan children is being planned for June 3 by

the Orphans' Automobile Association. If the plans mature the children will be taken in automobiles to some shady playground or resort near the city for a day's outing at no expense to themselves or their guardians.

BOSTON PLANS A. A. A. MEETING.

The annual meeting of the American Automobile Association, which will be held in Boston, May 17-18, is expected to bring to that city the largest gathering of automobilists from all parts of the country that has ever visited it. Arrangements for the convention are in charge of the Massachusetts Automobile Association, of which L. R. Speare is president.

The gathering will be held at the Copley Plaza hotel. Between 400 and 500 delegates are expected. John H. Wilson, Franklin, Penn., is president of the association, and A. G. Batchelder, New York City, is chairman of the executive board.

The annual banquet of the association at the Copley Plaza on Monday evening will be addressed by men of national prominence in motoring circles. A very large attendance is expected from the New England states. Special arrangements are being made to entertain the ladies. This will consist in the main of motor tours over the Paul Revere route, and to other interesting places in the vicinity of Boston.

From neighboring states many delegates will come in their own cars, but arrangements are being made to provide the great majority with cars while they are in the city.

The Illinois supreme court has rendered a decision to the effect that cities may not collect a wheel tax on vehicles used for pleasure and recreation. Cities will lose a large amount by this decision, Chicago alone having to forego the collection of \$500,000.

According to estimates by the Studebaker dealers in the northwest, 15,000 automobiles will be driven over the Columbia highway to the California expositions this year.

GENERAL NEWS OF THE INDUSTRY.

Packard Company Breaks Shipping Record and Increases Space—Prosperity Items About Other Companies—Goodyear Takes Employees Into Partnership.

INDICATIVE of the prosperity that the Packard Motor Car Company, Detroit, Mich., is now experiencing, is the statement that more vehicles were shipped during the past month of April than in any other month of the 14 years that the company has been in existence. The total value represented by these cars is given as \$2,423,000. Immediately after making this announcement, the company issued a statement to the effect that new buildings and extensions now under construction will add 15 per cent. to the present 38 acres of floor space. The enlargement extends from the forge and foundry all through the manufacturing division to the final assembly departments. The additions include a six-story building. These building activities seem to indicate that the Packard company is preparing for a largely increased volume of business.

At the labor end of the Packard business is the statement that the company is increasing its force at the average rate of 50 additional employees per day. Since March 22 about 1600 new workmen have been engaged, and the scene illustrated is an every day occurrence. Upon applying for a position with the company, applicants must be prepared to successfully pass a careful physical examination. The examining staff is to be one of the busiest of all departments.

GENERAL ELECTRIC SALES DECREASE.

The net profits of the General Electric Company, according to its annual report for the fiscal year 1915 were given as \$11,287,827, as against \$13,489,357 in the preceding year. Gross sales were reported as \$90,467,692, as compared with \$106,477,439 in 1913, while profits from manufacturing were \$8,970,963, as against \$14,065,789.

The percentage earned on \$101,485,700 capital stock was equal to 11.12, while in the preceding year it was equal to 13.2 on \$101,381,

200 capital stock. Surplus after deducting dividends and interest was \$3,145,061 as compared with \$4,908,675 in 1913. The net book value of the company's plant Dec. 31, 1914, was stated as \$31,063,331.

FISK PROFITS REACH \$942,204.

The Fisk Rubber Company, Chicopee Falls, Mass., gained net profits of \$336,199 over the last fiscal year, according to the annual statement covering the year ending Oct. 31, 1914. The total net profits for 1914 were \$942,204, as compared with \$606,001 for 1913. The balance for dividends, after deducting reserve, adjustment and



Possible Packard Workmen Awaiting Turn to Be Examined Physically Before Receiving Employment.

inventory, is shown as \$782,204, as against \$488,312 for the preceding year. The first and second preferred amounted to \$350,000 and the net surplus was shown as \$432,204.

CHASE'S PHILADELPHIA MANAGER.

On the eve of departure for the Pacific coast on a business trip, H. T. Boulden, general sales manager of the Chase Motor Truck Company, Syracuse, N. Y., announced that the management of the Chase Philadelphia branch would be placed in the hands of J. A. Inness, to succeed A. E. Fisler, who leaves to enter another line of business. Mr. Inness was a Chase representative in earlier days, and for the past two years has

directed the motor truck department of the Chicago Pneumatic Tool Company in the Philadelphia territory. In addition to this announcement was the statement that a complete service station will be installed. All the territory comprising eastern Pennsylvania, New Jersey, Delaware, Maryland and the District of Columbia will hereafter be served by the Philadelphia Chase organization.

H. C. BRADFIELD JOINS KING.

H. C. Bradfield, who, during the past four years, has been connected with the Cole Motor Car Company and the Premier Motor Manufacturing Company, has joined the King Motor Car Company, Detroit, Mich., where he will head a



H. C. Bradfield, King Sales Specialist.

special department whose function it will be to co-operate with dealers in working out their sales and advertising problems. The King has been making fast progress in the eight-cylinder field. The company recently shipped the first full trainload of eight-cylinder cars to leave an American factory. They went to the Chicago dealer.

MORE PARTNERS IN GOODYEAR.

For the past 10 years it has been the policy of the Goodyear Tire and Rubber Company to present the more important and efficient of its employees with blocks of stock in the company.

All of the stock which has previously been used for such distribution has now been exhausted, so at a directors meeting in June action will be taken to increase the capital stock of the company to care for the young men who are now candidates for partnership. It has been the practice of the company in the past to set aside the stock in the employee's name and permit the accumulating dividends to pay for it at par.

MARMON INCREASES SALES FORCE.

A recent addition to the sales force of the Nordyke & Marmon Company, Indianapolis, Ind., was made by the acquisition of A. L. Elwood, former manager of the St. Louis branch of the Locomobile Company of America. Mr. Elwood began his connections with the automobile industry about 10 years ago as manager of the automobile department of the Turner Brass Works, and for the past five years has been connected with the Locomobile company. He joins the Marmon forces at once and will do territorial work in connection with the agents.

WILL SELL MOTOR KART ASSETS.

The assets of the Motor Kart Company will be sold at auction by Charles Shongood, United States auctioneer for southern district of New York in bankruptcy, on Wednesday, May 19, by order of the court, at 114 Hudson avenue, Peekskill, N. Y. The assets include an up-to-date plant of machinery for the manufacture of automobiles, parts, tools, accessories, material, etc., and also the trustee's right, title and interest in and to the real estate and factory building.

SAXON'S BIG INCREASE.

During the past month of April shipments showed an increase of 900 per cent. over the corresponding year at the Saxon Motor Company plant, Detroit, Mich. It is expected that the record for May will show corresponding increase. The production schedule calling for 3000 cars of the six-cylinder touring and the four-cylinder, two-passenger models.

SEEK AMERICAN CONNECTIONS.

Two Australians, L. L. Remington, general manager, and H. P. McColl, chief engineer of William McLean & Co., Melbourne, Australia, are touring America seeking connections with American manufacturers in automobile and other engineering lines. Their firm is an importer and distributor of machinery in Australia.

The former trustee of the bankrupt Norwalk Motor Car Company having filed his report, a creditors meeting will be held for the purpose of considering the report, May 17, in Cleveland, O.

LAST YEAR FOR CARTERCAR.

According to a statement that is circulating through industrial channels, the General Motors Company is contemplating the closing of the Cartercar plant, Pontiac, Mich., at the conclusion of this year's output, which will be about the last week of May. It is said that the plant will be turned over to the manufacture of the new light "Six," which the General Motors Company has been developing and expects to turn out at the rate of 30,000 a year. The new car will sell for less than \$1000, and will have a Northway engine. The present Cartercar dealers will probably be given the opportunity to handle the new machine. It is stated by reliable authority that a stock of parts, etc., for the Cartercar will be carried for the benefit of Cartercar owners.

FORD REBATE IS ASSURED.

The rumors that have been circulating to the effect that \$15,000,000 would be rebated by the Ford Motor Company, Detroit, Mich., to this year's purchasers of Ford cars, at the rate of \$50 to each purchaser, have been substantiated by Henry Ford himself. Mr. Ford recently stated while in New York City that the production of 300,000 Ford cars during the fiscal year ending August, 1915, on which the rebate plan is contingent, is now practically assured. In fact, the total is expected to reach 325,000, which will make the total rebate about \$16,250,000.

ANOTHER PROFIT SHARING PLAN.

At a recent dinner given to its employees by the Neumann-Lane Company, Detroit, Mich., distributor of Pierce-Arrow, Chalmers and Rauch & Lang cars, checks for sums amounting to 24 per cent. of each employee's yearly salary who had been on the company's payroll for at least one year were distributed. It was announced at the dinner that a cash prize for \$100 would be given at the end of the year to the employee who, through the vote of all eligible employees, should be considered the best in the concern's employ. Superintendents and foremen are barred from the contest.

WHITE BUYING FOR PREMIER.

E. E. White, formerly associated with Frank E. Smith, the new head of the Premier Motor Manufacturing Company, Indianapolis, Ind., has been appointed purchasing agent to succeed E.

E. Westman, who has been placed in charge of the technical department of the company.

PREMIER'S PRODUCTION MANAGER.

The designing and manufacturing ideas which Stanley Whitworth, factory production manager for the Premier Motor Manufacturing Company, Indianapolis, Ind., has brought to the company were gained in a measure in Rhode Island, where he served his apprenticeship in the city of Providence. It is stated that Mr. Whitworth is largely responsible for the company's turning out one of the best products in its history, and has much to do with the general advancement of the plant.

Mr. Whitworth, who was raised in Providence, has had several valuable and responsible connections with automobile manufacturing and engineering. He has been associated with such men as Fred Moscovitz of the Marmon Motor Car Company; Chester Griswold, consulting engineer for the Franklin Manufacturing Company; Orlando Weber, vice president of the Partin-Palmer Company, and others. He was also connected with the manufacturing end of the Overland, Waverly electric and the underslung American cars, consistently advancing until he now holds a very important position in the automobile industry.



Stanley Whitworth.

SUCCESSFUL AUTO COMPANY.

Among the successful automobile concerns of the country, the H. H. Franklin Company, Syracuse, N. Y., takes high rank. For the quarter year ending March 31 the company shipped 37 per cent. more automobiles than for the same period of last year, while orders received increased 41 per cent. During some of the February and

March weeks the increase was estimated at 200 per cent. The company turns out about 66 cars a week at this time, and expects to increase that number rapidly. Since Jan. 1 cash receipts were 24 per cent. in excess of the corresponding period of last year. In 1914 the company earned 65 per cent. on its stock, and at present is said to be paying dividends of 24 per cent.

WEBER JOINS MAXWELL.

Orlando Weber, long identified with the automobile industry, having begun his activities almost at the inception of the business, has been appointed assistant manager of the Maxwell Motor Company, Inc., Detroit, Mich. In his new capacity he will



Orlando Weber, Assistant Manager of Maxwell.

relieve Walter E. Flanders, president and general manager, of a large share of the general supervision of the company. The sales end of the business will also receive a large part of his attention, according to present plans. Mr. Weber recently spent several months in European countries, where he made

a thorough study of the selling methods and the requirements of the trade, as well as making exhaustive investigations of the manufacturing end of the industry.

ELDREDGE GOES WITH PURITAN.

Frank M. Eldredge, widely known as an advertising expert and manager of advertising agencies in New York City and Denver, Col., has been engaged as advertising manager by Alfred O. Dunk, president of the Puritan Machine Company, Detroit, Mich. Coincident with this announcement, Mr. Dunk states that it is his intention to widen the scope of the company's general advertising and conduct a vigorous campaign to conform to the remarkable growth of the com-

pany, which is rated as the largest of its kind in the world. The Puritan company has bought up the stock and assets of more than 61 automobile concerns and supplies repair and service parts of machines that are not now being manufactured.

INTERNAL GEAR DRIVE ASSOCIATION.

Several makers of the internal gear drive types of truck axles and of trucks have associated under the name of the Internal Gear Drive Association, with headquarters at Detroit. George M. Davis has been made manager. The purpose of the organization is stated to be the formation of a general clearing house for information, and to conduct an educational campaign to acquaint dealers and truck users with that particular type of drive. It is said that it is not intended to conduct a fight against other types of rear drives.

The association includes the following: The Republic Motor Truck Company, Alma, Mich.; the Denby Motor Truck Company, Detroit; the Russell Motor Axle Company, North Detroit, and the Torbenson Gear and Axle Company, Newark, N. J.

ELSIE DE WOLF WITH LOCOMOBILE.

Elsie De Wolf, actress and interior decorator, has been secured by the Locomobile Company of America, Bridgeport, Conn., to design special de luxe Locomobile closed bodies. Lamps and metal work for these bodies are designed by the Tiffany studios.

The Locomobile Company of America, Bridgeport, Conn., is now at work upon a \$4,000,000 contract for motor trucks for the British government, and has recently entered into a \$1,000,000 contract with the Russian government for trucks similar to those being built for England.

The Premier Motor Manufacturing Company, Indianapolis, Ind., is supplying inquirers, when requested, with some interesting data sheets on their new 6-50 Premier car, which deal with mechanical features of the machine.

The Kissel Motor Car Company, Hartford, Wis., has issued a miniature booklet setting forth in vivacious verse the merits of the "All-Year" KisselKar. It is lithographed and is a very handsome piece of literature.

A bill before the Wisconsin legislature renders an automobile attachable for a garage bill.

THE NEW NATIONAL "NEWPORT" SIX.

HAVING standardized its six-cylinder chassis after long experience has proven it to be remarkably efficient and economical, the Na-

while it is extremely harmonious in appearance, no matter what the equipment. The statement is made by the company that in producing the new body the National policy of "better design" has been carefully observed, and that every change has been made, because it makes it a better car—plus a more elegant appearance.

All National Chassis the Same.

Mechanically all National cars are the same. The motor is a special National design, it being a six-cylinder, L head, vertical, water cooled, four-cycle type, with the cylinders cast en bloc from a special quality of gray iron. The bore is $3\frac{3}{4}$

inches and the stroke $5\frac{1}{2}$ inches. The block is cast with the water jacket integral, and with a large opening above the cylinder heads that insures complete cleaning of the water passages and uniform circulation of the water in the cooling system. The opening is closed with a centrally channelled plate that carries the water outlet manifold, that is secured by a series of studs. The block has wide base flanges and on the right side are four webs, against which are seated the three plates that cover the valve stems and tappets.

The pistons are cast from the same material as the cylinder block. The machine work is very carefully done, extreme care being taken to finish both pistons and cylinders. The pistons are channelled for four eccentric compression rings, are made with special oil recesses and the walls are drilled to insure complete distribution of the lubricant. The crankcase is cast of an aluminum

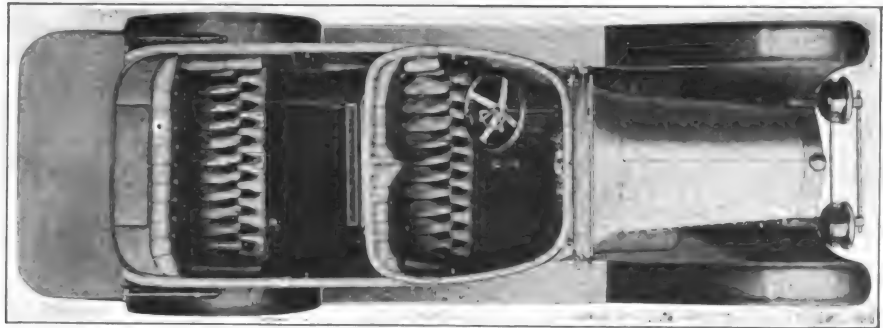


National Newport Body with the One-Man Top Raised, the Design Being Especially Artistic.

tional Motor Vehicle Company, Indianapolis, Ind., has devoted its engineering staff to the development of body equipment that will be equally satisfactory from the viewpoint of the discriminating motorist, who demands the extremes of comfort and convenience without the sacrifice of the qualities that obtain with power and capacity.

The chassis built for National cars are identical save that equipped with the roadster body, in which the wheelbase is 124 inches instead of 134, the reduction of length being to obtain greater convenience while turning. These are equipped with eight different types of body, which include a two-passenger roadster, four-passenger (toy tonneau), five-passenger touring, six-passenger touring, four-passenger coupe, cabriolet (convertible roadster), parlor car and the latest production, the National Newport or four-passenger. All these are known as the National Series AB of Sixes.

The National chassis is distinctive among motor cars from the fact that it has exclusive qualities. It is the development of 15 years' experience with motor car construction and it is designed to have speed, economy of operation, ease of driving and an unusual degree of comfort.



Plan View of the National Newport Body, Which May Be Had with the Rear Seat Clear or Divided.

alloy in two sections, the upper half with two transverse webs, and the lower half without webs, this serving as an oil pan.

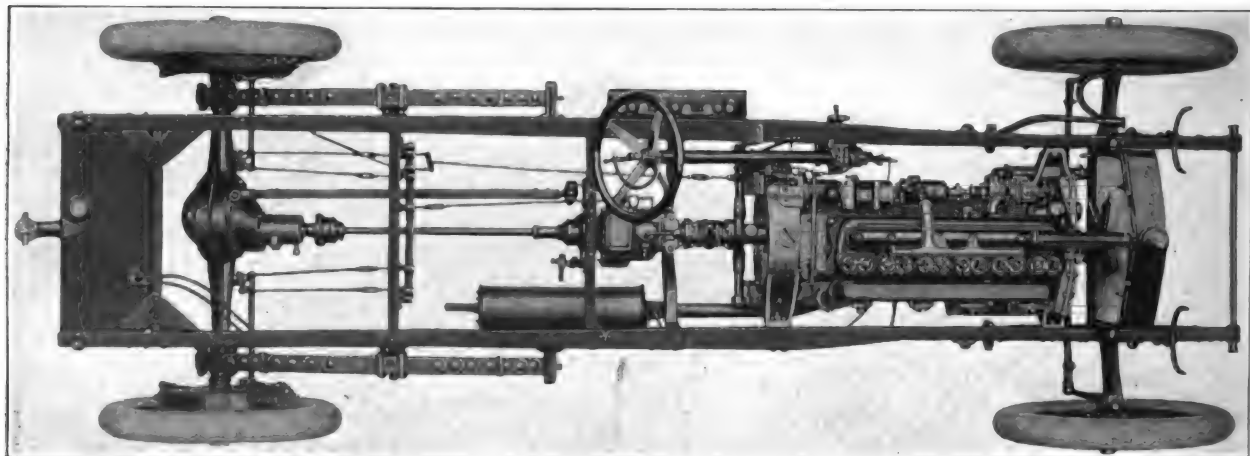
Construction of the Crankcase.

The crankcase is built with a forward extension to house the timing gears and at the rear is a bell housing that encloses the flywheel, on which the rear supporting arms of the motor are integral. On the upper section of the crankcase are magneto and generator brackets. The pinion shaft of the motor starter is carried through the bell housing at the left side of the motor to engage with a gear cut in the periphery of the flywheel. The four main bearings are mounted in the upper section, these being of large diameter and length. The crankshaft is drop forged from open hearth steel and is carefully machined and heat treated.

The crankshaft bearings are nickel babbitt

ter through a radiator, forced by a centrifugal pump having a bronze impeller and bronze bearings, and by a fan mounted on an adjustable bracket carried on the forward end of the cylinder block and driven by a flat belt from a pulley on an extension of the water pump shaft. The fan shaft is fitted to a special anti-friction bearing. The water pump shaft also drives the magneto and the air compressor for tire inflation. The engine is lubricated by a pump that draws the oil from the reservoir and forces it through tube to all of the main bearings and timing gears, the excess flowing to troughs in the base of the crank chamber, where it is distributed by splash to the camshaft bearings, cams, tappets, connecting rod bearings, the piston and cylinder walls.

The carburetor is an automatic float feed type, mounted on a manifold of aluminum of special design, that is water jacketed. Statement is



Top View of the Stripped Chassis of the National Six-Cylinder, the Machine Being Extremely Well Harmonized in Its Arrangement.

mounted in bronze shells. The connecting rods are drop forged, I section, open hearth steel, heat treated, the big end bearings being nickel babbitt in bronze shells and the wristpin end bushed with phosphor bronze, these bearings oscillating on the wristpins. The camshaft is large and is mounted on four liberal phosphor bronze bearings. The valve mechanism is conventional, the tappets operating in renewable guides in the base flange. These tappets are adjustable for length with hardened screws and nuts. The valves operate in guides in the cylinder block. The timing gears are helical cut to insure noiseless operation, and the idler gear is mounted on an adjustable stud so that relation of the gears may always be maintained. In the timing gear case is enclosed the broad, silent chain by which the crankshaft is turned by the starting motor.

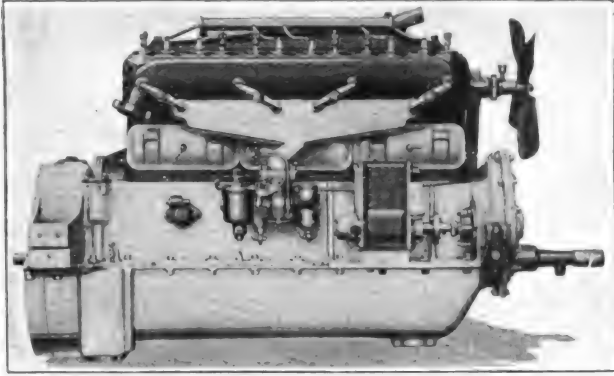
The engine is cooled by a circulation of wa-

ter that all of the cylinders receive the same volume of fuel under all conditions of operation. The intake manifold is retained by a series of four clamps that are secured to studs. The riser is short and the carburetor is very accessible. The ignition system is an Eisemann high-tension magneto and one set of spark plugs, no outside source of current being used.

Will Develop 58 Horsepower.

The horsepower rating of the motor is $33\frac{3}{4}$ -horsepower by the S. A. E. formula, but the claim is made by the company that the engine will develop 58 horsepower, or practically double its rated capacity. The clutch is a self-contained leather-faced aluminum cone that is spring cushioned to insure easy engagement, and the assembly is easily removable should occasion require. The clutch shaft is coupled with the main shaft of the gearset by a grease-packed universal joint.

The gearset is mounted on two frame cross members on three points, and it is a selective sliding gear type, having three forward speed ratios and



Right Side of the National Six-Cylinder Motor, Showing the Specially Designed Intake Manifold and the Westinghouse Generator for the Lighting and Starting System.

reverse. The gears are large and the shafts are mounted on annular ball bearings throughout.

The main driving shaft between the gearset and the full floating rear axle has a universal joint at either end. The rear axle is specially designed and has a cast steel housing that is strongly webbed. The driving pinion and the master gear of the differential assembly are helical cut, so to operate without noise.

Access to the differential is by a large cover plate at the rear side of the axle housing. The gears and shafts are large, and the wheels are each fitted with two roller bearings, which carry all the radial load. The torsion and driving stresses are taken by a pressed steel torsion arm that is vertically pivoted to the axle housing and spring mounted on a heavy frame cross member.

Other Chassis Details.

The front axle is a special steel drop forged, I section, with generous steering knuckles, which are fitted with large roller bearings for the wheels. The frame is a five-inch pressed steel channel section, with numerous cross members and strongly reinforced, the rear end being cambered to afford a low suspension of the body and low centre of gravity. This is mounted on semi-elliptic forward springs and straight cantilever springs, a type which the National company has developed and specialized, that are outside the frame. These springs are pivoted on brackets on the frame and are shackled at the forward ends, being secured to large spring seats on the rear axle housing. The springs are practically horizontal in service. The construction makes for extremely easy riding, obviating all end throw,

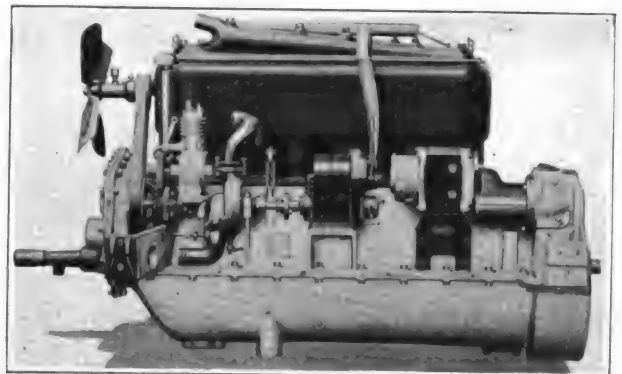
and giving a steadiness that is surprising. Statement is made by the company that with this construction and the location of the seats the National Newport model rear passengers have the same riding comfort enjoyed by those in the forward seats.

The steering gear is a worm and sector type, the connections all having means of adjustment. The control is by the conventional foot pedals that operate the clutch and service brake, by hand levers on the steering wheel that vary the ignition point and the fuel supply, and by hand levers for shifting the gears and operating the emergency brake that are located in the centre of the footboard. The brakes are very large, these being external contracting bands and internal expanding shoes that operate on and in steel drums on the rear wheels. The brakes are equalized and are easily adjusted.

Body Equipment a Feature.

The body equipment is the real feature of this machine, and there are very many qualities that recommend it to the motorist who is desirous of obtaining the greatest degree of satisfaction and the real luxury of a car. The body is the same length as the Salon touring car, but the rear seat is set forward and nearer the centre of the chassis, so that the passengers have extreme ease and are free from end throw that is noticeable with machines that have other forms of spring suspension.

The body is distinctively streamline and is unusually attractive in appearance, being narrow and graceful and with that smartness that is realized from unbroken lines and harmonious curves.



Left Side of the National Six-Cylinder Motor, Showing the Air Compressor, Water Pump and Magneto, Driven by a Single Shaft, and the Westinghouse Starting Motor.

It is the development of extremely careful study and experimentation, for every detail has been worked out with regard for the character and

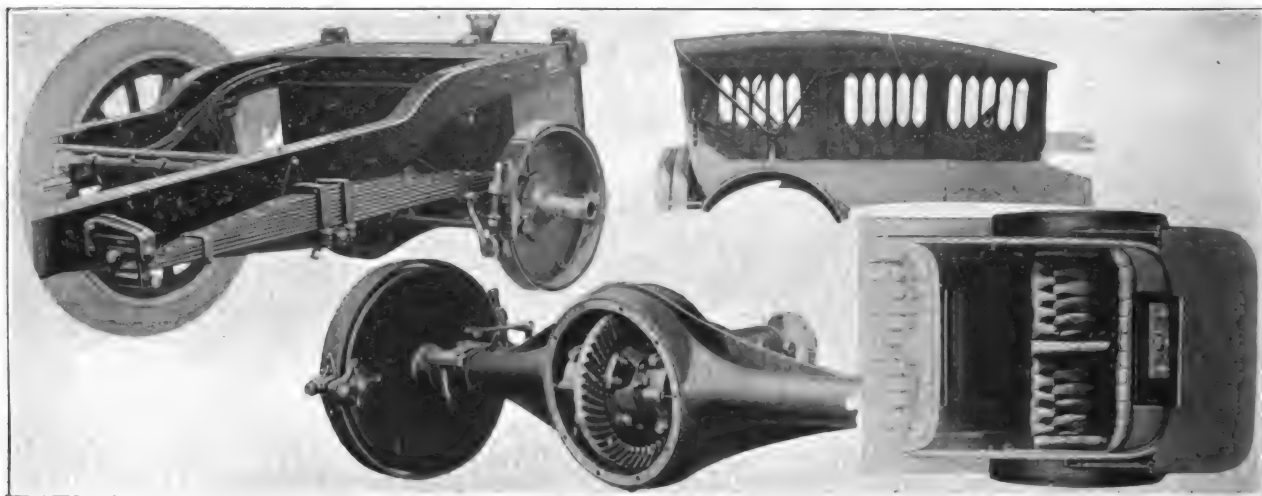
harmony that is so pronounced in the design. All moldings have been dispensed with, the doors set flush with the body and the upper edges of the sides have been cleverly molded round. There is not an angle in the layout.

The finish and upholstery of the body are equally characteristic. The seats are deep and roomy and remarkably comfortable. The cushions are handsomely finished leather over deep padding of curled hair and luxuriant springs. The rear seat is divided, so that each passenger is as comfortably seated as if in an arm chair. In the centre arm is a glove box that is accessible by raising the top of the arm. The purchaser can have option of the divided or open seat. The sides of the car are slightly higher, so that the passengers appear to be sitting in the car instead of upon it, and as there are arm rests for both the

door can be lifted instantly when desired.

The car is lighted by the Westinghouse system, this having the two head lamps and the tail lamp, and this same system is used for starting. The storage battery is carried in a compartment at the left side of the frame. The 21-gallon gasoline tank is placed at the rear end of the chassis and the fuel is fed by pressure. The equipment includes a one-man top of "never leak," a water proof material; "jiffy" curtains of the same material, ventilating and rain vision windshield, Warner autometer with a 75-miles an hour dial, electric horn, power tire pump, double tire carrier and gasoline gauge.

Throughout the chassis more than ordinary care has been taken to insure full lubrication and accessibility for adjustment, and every detail that makes for long and enduring service has re-



Some Details of the National Newport Construction: Upper Left, the Straight Cantilever Rear Spring and the Brake Assembly; Lower Left, Section of Full Floating Rear Axle with Differential Housing Cover Removed; Upper Right, Suggestion of the Car with the Body Enclosed by Curtains; Lower Right, the Divided Rear Seat and the Luggage Storage Compartment Back of It.

front and rear seats inside the body, the occupants can obtain maximum comfort without placing their arms on the sides or outside.

Some Specialties of Body Design.

The front seats are made open so that the body can be narrow, and in the left front door is a special compartment for tools that can be locked. The tools are instantly accessible when needed. One feature is a special baggage carrying compartment directly back of the rear seat in the body. The door can be raised by a convenient handle, and there is sufficient space to stow all the luggage that a party would ordinarily require, leaving the seating compartments perfectly free for the passengers. When the compartment is closed the door is practically concealed, but when the top is raised or lowered the

ceived attention. Claim is made that the owners of this type are driving an average of more than 17 miles to the gallon of fuel and that they are getting from 8000 to 10,000 miles from each set of tires. The price is \$2375 complete.

LITCHFIELD CLUB ELECTS OFFICERS.

The following officers have been elected by the Litchfield County Automobile Club of Connecticut for the ensuing year: President, F. U. Newcomb of Litchfield; vice president, N. D. Holcomb of Thomaston; secretary, C. D. Moore of Winsted; treasurer, E. R. Holmes of Winsted. The club now has 115 members. It has decided to remain a member of the state automobile association for the coming year.

FIRST MOTOR NEWSPAPER DELIVERY.

NOT only is the Hotel and Railroad News Company of Boston the true pioneer in the use of commercial motor vehicles in America, but it anticipated the commercial truck industry. For 17 years it has owned and operated motor vehicles in its delivery system, and a number of these it built in its own shops before trucks had been placed on the market as a commercial proposition by regular makers.

For many years this company has had a contract to distribute Boston newspapers from the publication offices to the various dealers in Boston and outlying towns. In 1896 newsdealers of Dedham, Hyde Park and the southwestern section of Boston complained of the service. It was as good as could be given with horses. But in an effort to remedy conditions the company, having heard that an electric vehicle had been built and successfully operated by Fisk Warren of Brookline, Mass., decided to construct one in its own shops, which it hoped would prove more efficient than horse vehicles.

The car was built, but owing to the difficulty of securing the right sort of batteries and because of crudities in design, it was not successful. After repeated efforts with the electric vehicle the gasoline type was taken up. A car known as No. 31 was built and put in operation. This was probably the first usable motor vehicle built in America for freight carrying.

It had a Brennan double-opposed, 12-horsepower motor, which was not sufficiently powerful to carry the heavy loads that must be hauled. There were the usual mishaps that beset the pioneer in any mechanical field. The design of this car, however, was quite similar to that now in use.

A water cooled motor was carried under a hood in front of the dash. Power was transmitted by jackshaft and side chains and the brake was fitted to the rear wheels. The body was suspended on semi-elliptic springs. It was a standard express type and was covered with rub-

berized cloth to protect the contents.

When its defects became evident another was built with a 50-horsepower Trebert engine. This was known as No. 5, and in design it was what would now be considered standard. It was completed in 1902. This machine was quite successful, but it had an excess of power for the strength of its parts and repairs were frequently necessary.

While No. 5 was in use on the Roxbury-Hyde Park-Dedham route, experiments were made



Pioneer Truck Built Specially Before Motor Trucks Could Be Purchased on the Market.

with other machines. Motorcycles had not the necessary load capacity, and the Orient buckboard was small powered and not dependable. So No. 5 was followed by another car of similar design, known as No. 26. This was better than the others and was used successfully for years.

About five years ago the New Haven railroad discontinued many of the morning newspaper trains out of Boston. It was necessary to find some other means for transporting the papers and the company purchased a number of used passenger automobiles for this purpose. Some of these were operated until about a year ago. Then they were replaced by light trucks.

There are now five newspaper motor routes out of Boston. The cars leave Boston at 4:30 in

the morning and make from 22 to 40 miles, some of them running 35 miles an hour until their work is done. They are operated on a close schedule, which must be maintained as nearly as possible. For that reason extra tires are carried on demountable rims and every precaution taken against delay.

The cars now used by the company are two White 3000-pound wagons, equipped with pneumatic tires, and three Autocars. The Autocars are driven on solid tires, and this feature alone is valuable in work where it is necessary to maintain an exact schedule, as it obviates delay that might arise through tire trouble.

The motor cars have been very successful on the suburban routes, largely because the newspapers have adopted the bundle system, so far as

afternoon the company distributes all the papers except the Boston American and the Christian Science Monitor, which have their own wagons.

It was the policy of the company before it took up motor hauling to build its own horse wagons and other equipment. Its combined stable and garage is a very effective service unit for both types of transportation. The experience gained in building several motor cars has equipped the organization with exceptional ability to keep its modern trucks in good condition.

GERMAN MOTOR CHAPEL.

A Cologne newspaper has donated to the German army three motor chapels. The first of these has been completed and has left for the front.

The spacious driver's seat will seat two persons and may be set up as a couch. A stretcher is carried inside, on which an additional bed may be made. Entrance is through a door on one side of the car. In the wall is a big cabinet for the robes of the chaplain and another cabinet for linen, books and other necessities. At the front of the car is a folding table which serves both for writing



A Modern White 3000-Pound Commercial Truck Used in Massachusetts for Delivery of Newspapers.

they are concerned. Inside the city the papers are delivered in bulk and have to be counted on the wagons. It is not practicable to count and arrange them, even for experienced men, on a flying motor car, and the time lost in stops for that purpose is such that it reduces the motor car to no greater efficiency than the horse wagon. For that reason the company retains its horses inside the city of Boston. But in the event of the adoption of the bundle system by newspaper circulation departments they could be used there with equal facility.

By 8 o'clock in the morning the wagons are all back from their morning routes and work is then begun to distribute magazines and other publications to the elevated and subway stands controlled by the company. It is also the distribution agent for 10 towns around Boston. In the

ing and as a washstand. At the rear of the car is the altar compartment. This is protected by a folding roof, which affords full protection from storms to the chaplain. Large red crosses are placed on the side of the car.

CANADIAN TROOPS USE U. S. TRUCKS.

The Eaton battery of the Canadian contingent that sailed for France last fall, carried with it several Jeffery Quad trucks, which were thoroughly tested in Canada before acceptance. The American consul at Southampton, England, reports that the trucks are giving every satisfaction, and are attracting universal attention. "Later on," he declares, "you should hear from the trade in Europe, for the Canadian outfit are shouting the worth and value of things made in America."

OFFER AID ON MOTOR LAWS.

To aid legislatures in framing motor laws and encourage standardization of legislative enactments in the various states as much as possible, an arrangement has been made by the American Highway Association and the Bureau of Municipal Research, New York City, whereby papers will be prepared on the motor laws of each state and supplied to their legislators.

These papers will be written by A. N. Johnson, highway engineer of the bureau of municipal research, and will discuss the laws now in force in each state, pointing out particularly the points at which they seem to be conflicting and vague and will indicate steps that might be taken to improve them. Included will be suggestions for model laws covering state aid to road improvements, the use of convict labor, issuing bonds for road construction, the management of local roads, the regulation of traffic and related subjects.

The American Highway Association, through its legislative committee, first secured the aid of the United States Office of Public Roads in compiling all road laws, and the present arrangement will extend still further the value of the exhaustive knowledge possessed by that office on road subjects. The highway association will also engage experts to appear personally before the various legislatures at public hearings to urge the adoption of improved road laws.

OBJECT TO LICENSE INCREASE.

The motorists of Pennsylvania are almost unanimous in their declared objections to the proposed increase in the cost of licenses in a bill now pending in the legislature at Harrisburg. The bill proposes an increase of about 100 per cent. taxation on all motor trucks and 50 per cent. on pleasure cars. The present rate, which is a 100 per cent. increase over that of six years ago, is \$5 to \$25, according to the horsepower of the machine. One of the leading organizations, which are protesting, is the Reading Automobile Club, Reading, Penn.

MODEL TRAFFIC LAW FOR NEW YORK.

The mayor's central committee on street traffic and safety, New York City, has decided to form a committee to consist of one representative of each line of business, which uses the streets of New York for traffic purposes, to unify their views and formulate a draft of an ordinance

for submission to the central committee. This ordinance is designed to cover the needs and requirements of all classes of traffic. Automobile associations are well represented among the men already nominated, some of them being R. H. Johnston, Automobile Dealers' Association; J. S. Marvin, National Automobile Chamber of Commerce; D. C. Fenner, Electric Vehicle Association; T. D. Pratt, Motor Truck Club of America; Maj. H. C. Wilson, Society of Automobile Engineers, and Elmer Thompson, Automobile Club of America.

NEW IOWA LAW LIKED.

Heavy buying of automobiles by farmers is showing in the actions of the legislatures in western agricultural states. Iowa has passed an automobile law which is much liked by motorists. Number plates need be issued only once in three years instead of every year. The fees are to be a lien on motor vehicles, and penalties are to be collected for delinquencies. Extra number plates are to be furnished for 50 cents each instead of \$1, as heretofore.

OHIO CUTS DEALERS' FEES.

A new law in Ohio cuts the cost of dealers' licenses from \$20 to \$10. License tags may be transferred from one car to another by the same owner on payment of \$1 for re-registration. Strong opposition has developed to a bill providing that lights shall not shine higher than three feet from the roadway for a distance of 75 feet in front of the car.

IMPORTANT DECISION FOR TAXIS.

Though the Mason-Seaman Transportation Company, New York City, professed to being a private hack business, through operating its taxicabs on contract with steamship companies, hotels, railroads, clubs, etc., the appellate division of the New York supreme court rendered a decision which in effect places the company's taxicabs under the public hack ordinance, which was amended recently as to rates.

For the first time in history of lower Delaware, motor owners may be taxed on their machines. This proposal is made by the board of education of Dover, it seeking to raise additional revenue for school purposes.

PRACTICAL MOTOR CAR REPAIRS.

ON MANY pleasure cars the gasoline is fed from the storage tank to the carburetor by air pressure. With many machines, especially older types, the gasoline tank must contain considerable pressure to insure a steady flow of fuel

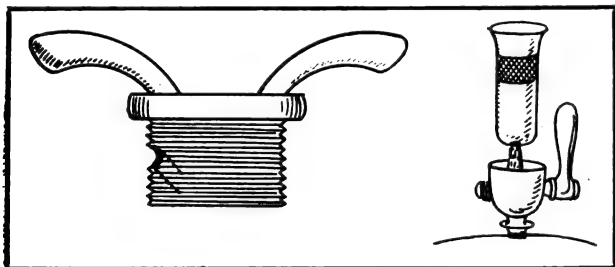


Fig. 31—Vent Cut in Gasoline Tank Filler Cap to Release Pressure, and Primer Made from a Tire Tube Dust Cap.

to the carburetor. Quite frequently no provision is made for releasing the air pressure from the tank when it is to be filled with gasoline, and if care is not taken in removing the tank cover it may be blown violently into the air, causing injury to the driver, or it may roll into an inaccessible place and time and effort will be necessary to recover it. A simple insurance against such a happening is to drill a small hole in the threads of the cap, as shown in Fig. 31. As can be readily seen, when the cap is screwed firmly into position it will be absolutely air tight, but when removing it the air will escape through the hole before the cap becomes detached from the tank.

VICES FOR POLISHED PIPE.

A very good way to hold pipe or rods which have polished surfaces is to sprinkle dry plaster of paris on heavy paper and then wrap the parts to be held in the paper. Care should be taken to make sure that there is plenty of powder between the paper and the polished surfaces for the entire circumference. Next take two blocks of wood and cut away the surfaces until they correspond in shape to the pipes or rods to be held. Next place the wrapped rod or pipe between the hollow faces of the blocks of wood and clamp firmly in an ordinary bench vise. When removing the paper if the plaster adheres to the pipe in hard cakes, do not scrape, but wash the surface with clean water, which will loosen the plaster and leave the polished surface unmarred.

A second method is to place the pipe between pieces of lead sprinkled with plaster and use a

pipe vise for a clamp. Still another method, which is often employed by mechanics who handle a great deal of polished pipe, is to face the hollow wood blocks with soft felt and then sprinkle this surface with crocus or plaster of paris so as to increase the friction. This method is clearly illustrated in Fig. 32.

EXTRICATING A STALLED TRUCK.

Many means are resorted to by clever drivers for extricating their machines from sandy places, mudholes, etc., and while some of these have been found practical only under certain conditions, the following method has not been known to fail no matter what the conditions. When an unloaded car goes into a mud hole or sandy place in the road, the situation is no joke, for usually considerable time and thought are required to extricate the machine. The situation will, however, be taken more serious when a heavily laden truck loses traction and the driver thinks that he must unload at least part or all of the freight before it can be moved. When such a mishap is met with the driver may jack a wheel and fill the hole with sand or brush wood, which can generally be found along the road. Not infrequently the traction of the wheel may be regained by placing burlap or a piece of board under a wheel and then starting the motor slowly.

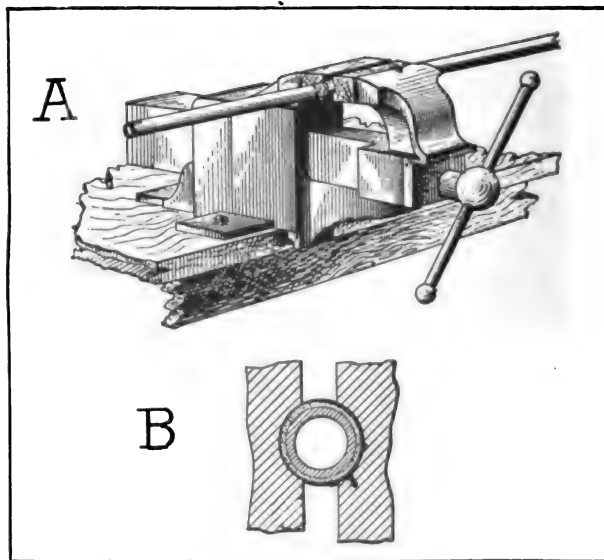


Fig. 32—Methods of Holding Polished Pipe: A, Clamp of Wood Blocks, Paper and Plaster of Paris; B, Clamp of Wooden Blocks Lined with Felt.

If the wheel is sunk deeply into the mud, or is on a very icy surface, these means may not be practical, as there will be no firm foundation and

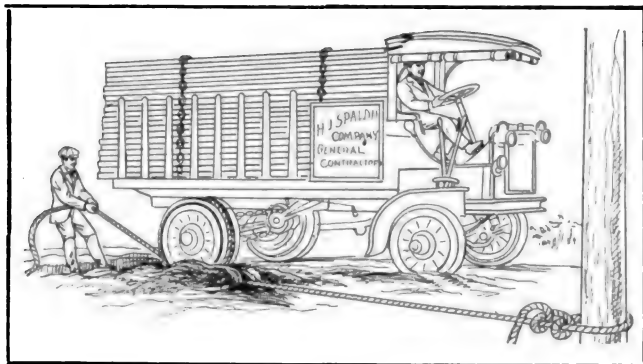


Fig. 33—Drawing a Truck from a Mud Hole by the Use of a Rope Wound Around the Wheel That Has Lost Traction.

the burlap or board may be carried backward with the revolving wheel. A method that has been thoroughly tested and found practical under all conditions is to take a good sized rope or chain, which are generally carried on a truck, and fasten one end to any convenient tree or post. If no tree or post is available a stake may be driven solidly into the ground. After making one end secure to the tree, the other end should be passed under the wheel and then over the top and under the bottom for the second time, following the channel between the dual tire. After having formed the loop around the wheel the free end should be held tightly by one man. When the car is started slowly in low gear, the wheel will wind the rope or chain as if it were a drum and pull the machine ahead. The lead of the rope ought to be placed at such an angle that the truck will move to a surface where traction can be obtained. The use of a jack may be necessary in some cases to get the rope or chain under the wheel, but in most instances the revolving of the wheel will carry the rope under. Incidentally, a section of wire cable about 100 feet long, with a hook spliced into each end, is necessary equipment to any truck, especially if used for long trips, or is driven over poor roads.

REMOVING WORN BEARING CONES.

When replacing a set of cones on a shaft or steering knuckle, removal of the old cones is not easily done and usually special tools are necessary. If care is taken, however, the parts may be removed with a hammer and tapered chisel. A simple means of removing a cone from a driving shaft is shown in Fig. 34 A. This requires the

slipping of a piece of tubing or pipe over the long end of the shaft until the tube reaches the back of the cone, and when the pipe is struck a sharp blow or two, the cone will easily be dislodged.

Care should be taken during this work to have the threaded end of the shaft rest against a piece of hard wood or soft lead, so that the threads will not become burred. When a small wheel puller is at hand the cone may be removed, as shown in Fig. 34 C. The cones on the steering knuckles will no doubt be difficult to start. The easiest way to remove a cone of this kind, when it is impossible to get anything behind it, is to use a sharp chisel and with a series of sharp blows drive it behind the cone as illustrated in Fig. 34 B. The chisel can be shifted from point to point around the circumference until the cone is removed. After the cone has been driven out a little ways a brass rod can be used as a drift and thus eliminate the danger of cutting the knuckle. In replacing the cone a small piece of tubing, as shown in Fig. 34 D, is used. It is essential that this member be driven on squarely and the pipe used to drive it on should be of soft material so as not to mar the ground and hardened surface of the cone.

FORCING IN VALVE GUIDE.

Most higher grade motors have removable valve guides. A large part of the engines, possibly a majority, have the guides cast integral with the cylinders, but nothing commends the practise except the low cost. When the valve guides become worn air will leak between the valve stems and guides and weaken the gas admitted to the cylinder. Usually the only practical repair when the guides become worn is to drill the

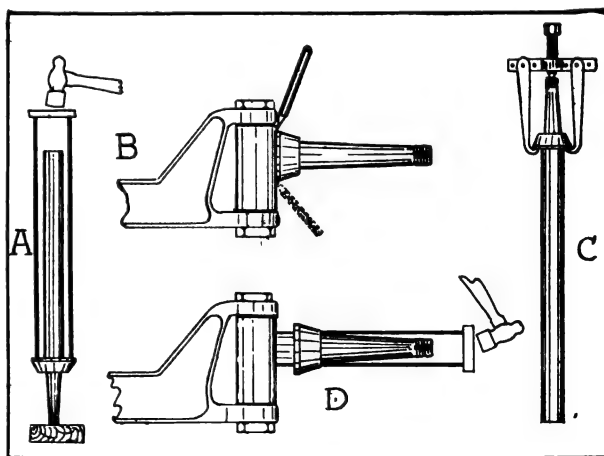


Fig. 34—Removing Worn Bearing Cones: A, Starting a Bearing with a Section of Tube; B, Use of Thin Chisel; C, Wheel Puller Is Very Useful; D, Driving on Cone with Tube Section.

guides to a larger size and insert bushings or have the valves made with stems of larger diameter to fit the worn guides.

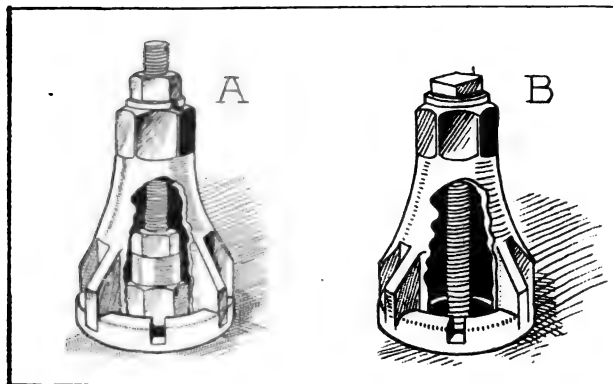


Fig. 35—Removing Valve Caps: A, Fitting for Holding Socket Wrench on Intake Valve Cap in Place; B, Fitting for Removing Exhaust Valve Cap.

The approved method of building cylinders, although it costs more, is to have the valve guides separate fittings. When these bushings become worn they can be forced out and replaced with new. The bushings may be easily hammered out and the new ones may be hammered in if extreme care is taken, but this method requires very careful work, because of the possibility of springing the guide, a device which can be made in a very little time will no doubt be found especially useful. To build this tool, take a piece of cold rolled rod about the same size as the diameter of the guide and run a thread for the whole length. The rod is then placed through the valve seat and guide, and at the lower end the bushing is placed over the rod and locked in place by a nut.

Over the valve chamber place a piece of flat stock about a quarter inch thick, an inch wide and of such length as will bridge over the valve cap opening. A hole should be drilled through this and the rod passed through the hole and then locked in place by a nut. With this tool forcing the bushing into the guide is simple. One has simply to screw down on the top nut and the bushing will be drawn into the guide. This method is illustrated in Fig. 36 A.

REMOVING VALVE CAPS.

Valve caps are generally socket types—that is, the upper faces of the caps are shallow sockets with rims formed to securely hold the socket wrenches used in handling them, and of such strength as will resist the pressure of the wrenches when tightened or loosened. The

wrenches are generally hardened, but the valve caps, because they are subjected to intense heat, are soft and are often bruised or deformed by careless use of tools. When valve caps are worn or misshapen, removal from the cylinder castings becomes difficult because of the tendency of the wrenches to lift from the sockets whenever pressure is applied, and the only solution is holding the wrenches rigidly upright in the sockets. This can be done with the base of an old spark plug and a bolt screwed into it instead of the insulator.

The bolt should be long enough to project through the top of the tool so that a washer and nut can be applied. To remove the valve cap the spark plug is taken out and the old plug, which contains the bolt, is screwed in its stead. The wrench is then placed over the bolt and fitted to the socket, after which the nut and washer are applied as shown in Fig. 35, thus holding the wrench in place. When this is done the valve cap and the removing tool are practically one unit and a long spanner can be applied to the hexagon on the tool and the cap will be removed with the greatest ease and safety.

A small priming cock is fitted on the exhaust valve caps of many engines, and to handle these a wrench similar to the one described above can be made. Procure a bolt of the same diameter as the hole in the cap and then drill a clearance hole for it in the top of the removing tool. To remove the cap the small priming cock is taken off and the tool fitted on the cap. The bolt is next inserted through the clearance hole in the top of

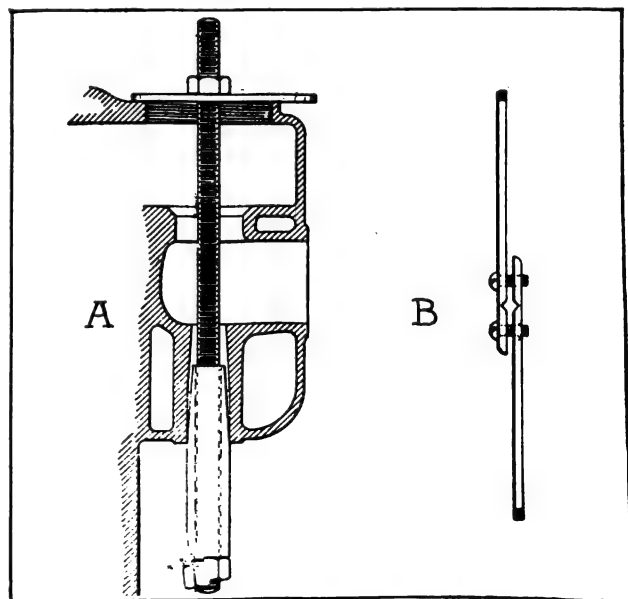


Fig. 36—A, Special Tool for Setting Valve Guide in Cylinder Casting; B, Handy Tap Wrench.

the tool and screwed firmly into the hole from which the priming cock has been taken. This is practically the same method as first described, as the cap and the tool are practically one and can be easily removed. When a valve cap has been screwed on tightly, for some time considerable force is usually required to move it, but with the tools described one can remove any cap from a cylinder. See Fig. 35 B.

A HANDY TAP WRENCH.

A man gifted with mechanical skill can make many handy tools at very small cost, which will prove to be in every way as satisfactory, although not so neat in appearance, as the most expensive productions designed for particular classes of work. A wrench for gripping machine taps and reamers can be easily made from two small pieces of flat steel and two machine screws. If the flat pieces cannot be procured in steel, iron can be used. Near the end of each piece and about one-inch apart, drill two holes. One piece should be drilled for a quarter-inch tap, while the other piece should contain clearance holes. Tap out the holes and assemble the parts, using machine screws of $\frac{3}{4}$ -inch length. The ends of the wrench should be rounded for convenient handling and centrally between the holes should be filed a "V" shaped groove about $\frac{1}{16}$ -inch deep. The dimensions given can be varied at will and the wrench can be made in any number of sizes that may be necessary. Small thumb or butterfly screws can be used if handy, thus making the adjustment to different sizes much easier. This wrench is illustrated in Fig. 36 B.

CLEANING PLATINUM POINTS.

The efficiency of the vibrating coil depends largely upon the condition of the platinum points.

If the points of the trembler blade and the adjusting screw become pitted or burned, more current will be required to overcome this resistance and the operation of the motor will be more or less affected. Some points will pit or burn more readily than others, due to the impure metal used or to the poor adjustment of the points. When the points become pitted or burned the only possible remedy is to obtain new surfaces. Usually this is done by removing the points and with a fine file smooth the surfaces until all pit holes, etc., are removed. The danger of this method is, however, in that the surfaces of both will not be filed evenly and will easily pit again. Fig. 37 A illustrates a method for cleaning the points and obtaining a true surface without having to remove or alter the adjustment of the points. A strip of fine emery cloth is placed between the contacting points and a true surface obtained by moving the emery cloth back and forth, taking care to keep it perfectly horizontal. After cleaning one point the cloth is reversed and the operation repeated on the opposite point. Contacts which have been filed may be aligned by this method, which is also applicable to similar parts, such as contacts of a magneto, or the anvils and hammers of make and break ignition systems.

RADIATOR CAP SAFETY DEVICE.

The vibration of motors will some times cause the filler caps on the radiators to work loose, and as the caps are invariably lost on the road they are seldom if ever recovered. A temporary repair can be made by tying a piece of chamois or like material over the hole. A device which can be easily made by almost anyone with ordinary tools, and which will insure against the loss of the cap from the radiator, is shown at Fig. 37 B. It consists of a section of chain soldered to the cap

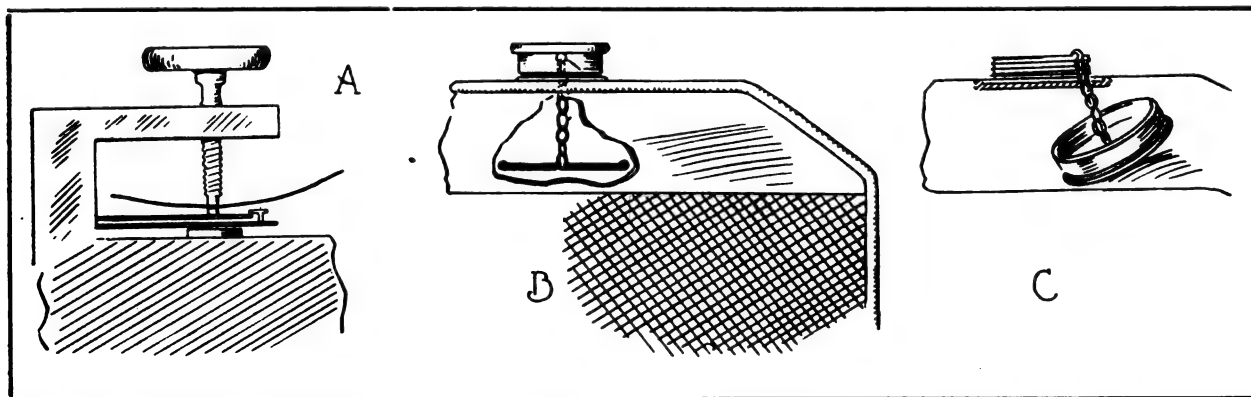


Fig. 37—A, Cleaning the Platinum Points of a Vibrator; B, Stop to Prevent Loss of Radiator Cap; C, the Practical Utility of the Stop.

at one end and with the other end attached to a bar longer than the diameter of the radiator filler. The length of the bar should be slightly less than

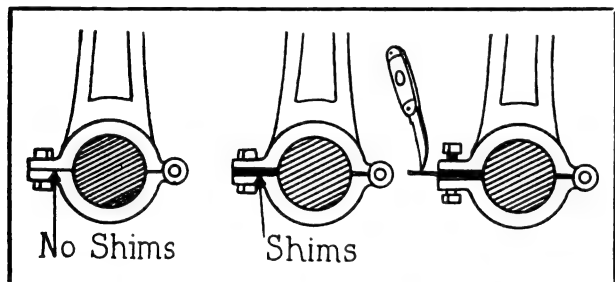


Fig. 38—A Connecting Rod Without Shims, a Bearing Rigidly Shimmed, and the Manner of Removing Shims with a Pocket Knife.

the inside width of the radiator, so as to permit the bar to turn when the cap is being screwed on or off. Fig. 37 C illustrates a cap which has loosened, but is prevented from falling to the ground and becoming lost by the chain attachment, which cannot be drawn from the filler.

REMOVING STAINS FROM TOPS.

When cleaning the lining of a top never use gasoline as a cleanser. Gasoline will remove stains, but quick acting fluids of this nature will destroy the water proofing of the fabric. The best method is to raise the top and after thorough brushing to carefully clean the spot with pure soap and water.

SHIMMING CONNECTING RODS.

Owners who do their own repairing often replace connecting rods without using enough shims. Much scraping and fitting is necessary to be sure of a perfectly fitting bearing and not infrequently a bearing is regarded as fitting if it bears for the greater length. Usually when a bearing is newly fitted there are certain high places that soon wear off, which wear will leave the rod loose. If the bearing is not promptly adjusted damage to the motor may result. If the rod has been correctly shimmed the adjustment can be made by reducing the number of shims. When the rod has been replaced with no shims or an inadequate number, the only remedy left for adjustment is to file the lips of the bearing.

Nine times out of 10 this will necessitate the removal of the rod from the cylinder, which will require quite a little time as well as labor. It will not be necessary to dwell on the fact that it is a great deal the better policy to file the lips of the bearing before installing and then closing the

gap with a sufficient number of shims. When the rod begins to wear it is then an easy matter to loosen the bolts on the rod and remove shims until the bearing becomes tight. The shims can best be removed by the use of a pen knife, as shown in Fig. 38. It should be a practise never to install a new connecting rod without using at least 10 shims. At Fig. 38 is shown two examples of fitting, one of these showing the incorrect method of fitting a rod, while the second illustration shows the correct way.

LOOSE FLYWHEELS.

In engines of earlier construction the flywheels were generally attached to the crankshafts by keys. In many cases these were not properly fitted, and because of the weight of the rims and the stresses upon the keys every time the motors were started or stopped, the keys would loosen and heavy flywheels would knock, with more or less damaging effect. When starting the motors the shafts and keys were brought violently against the wheels, causing wear on the keys, keyways and wheels; the key in the wheel would be worn at (x) and the keyway worn at (y), Fig. 39 A. Each variation in speed of the engines would bring the keys into forcible contact with either side of the keyways, causing sharp pounding or metallic knocking. Even with the most carefully developed means of flywheel retention, as shown in Fig. 39 B, the bolts securing the wheels to the flanges on the crankshafts will loosen and sharp knocks or pounding will be evident. In event of noisy operation which cannot be traced to ordinary causes, one may suspect the fastenings of the flywheel, which at least will bear an occasional inspection.

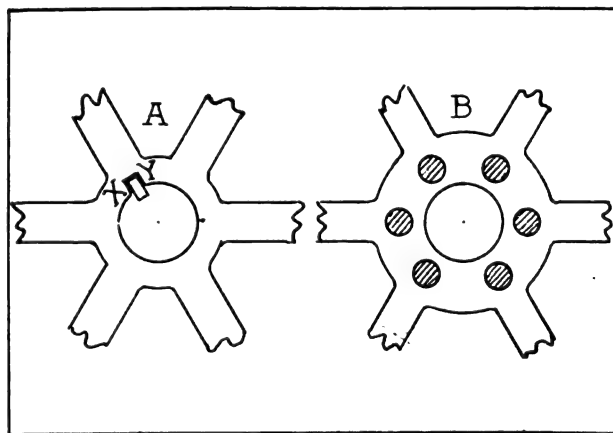


Fig. 39—A, Points of Wear with a Keyed Type Flywheel; B, Point of Loosening of a Bolted-on Type Flywheel.

MANY PRISONERS WORK ON ROADS.

THE idea of utilizing the labor of convicts in road work is taking hold rapidly in states all over the country and there are indications that a very large mileage of improved roads built in this way at small expense will be produced during the next year.

Massachusetts, which is always one of the most advanced states in matters of legislation, has made a careful study of the results achieved wherever this system is in use, and a bill to greatly broaden the scope of convict work on the roads is now pending in the legislature.

A law was passed last year permitting prisoners to be used on the roads by counties, cities and towns, the work being done under the custody of the local sheriffs. The present bill would place the direction of the work under the supervision of the state highway commissioner, as was recommended by the National Committee on Prisons and Prison Labor. This step was taken partly as a result of the success of the plan in Colorado, where roads that would ordinarily cost \$2,500,000. have been built at an expense of only \$50,000. West Virginia has saved 53 cents per cubic yard on road construction by using prison labor, and Iowa has been able, with no increase in expense, to pay the prisoners \$2.50 per day for their work.

In Maine, convicts must be put to work on the roads upon the filing of petitions by voters. Recently the Maine Automobile Association presented to the commissioner of Cumberland county, through its agent, Charles H. Knowles, a petition signed by 1000 voters of the county, asking that the prisoners in the county jail be put to work on the roads. The work will be done on the highways of Cape Elizabeth.

Thirty states in all had laws on their books permitting the use of convict labor on the roads at the beginning of the present year. In many of these states the honor system prevails, and guards are partly or wholly dispensed with while the men are at work. In other states guards are still deemed essential and there is much controversy between the adherents of the two systems. Georgia works 6000 convicts on her roads. The work is carried on under the direction of the counties, each county making requisition on the

prison commission for the number of men it needs.

Experience has shown that 15 men form the most economical unit for one guard to handle. The working gangs usually consist of six such units, a number that can be watched at night by one guard. The day guard acts as road foreman, which lessens the cost of the work. The National Committee on Prisons and Prison Labor, however, urges that trained road foremen be employed.

Time studies, and other efficiency investigations, are being made of the methods used in various places for working convicts, and when they have been completed the results will be published with a view to standardizing the most effective procedure throughout the country.



Making Men and Roads—Prisoners Constructing Highways in New York State.

While most of the prisoners now employed in that way are those convicted only of misdemeanors, Warden Rattigan of Auburn prison, New York state, has declared that he considers it entirely practical to use the labor of long term prisoners in this way. Arizona, Arkansas, Idaho, Louisiana, Maryland, Montana, Nevada, New Jersey, New Mexico, Ohio, Oregon, Virginia and Washington use a system that places the control of the work under the state highway commission. The prison department supplies on requisition such prisoners as may be suitable for road work.

The prison commission or board of control directs the work in Colorado, Indiana, Iowa, Kansas, Michigan, Missouri, North Dakota, Oklahoma and Wisconsin. State prisoners are turned over to the county authorities in Florida, Georgia and North and South Carolina. This latter system is condemned strongly by the National Committee of Prisons and Prison Labor. The New York state system, which divides re-

sponsibility for the work between the state highways department, the county road commission and the superintendent of prisons, is also felt by all concerned to be faulty.

Utah, West Virginia and Wyoming have a system which is regarded by the national committee as best. The prison department has charge of all matters regarding the clothing, feeding and care of the prisoners. The road work is directed by the engineering experts of the highways department.

TOURING ROUTES OPEN EARLY.

Information reaching the American Automobile Association indicates that touring during the coming summer is to reach unprecedented proportions, and that unusual activity has already developed on the part of the road builders to get the routes in shape. The northern transcontinental roads will be open this year a month earlier than usual, owing to exceptionally light snows in the Rockies and in the Cascades. Aggressive action to get these roads into good condition has resulted from the recent organization of the National Parks Highway, which leads westward from Chicago through St. Paul and Minneapolis. After an inspection of every mile on the road it will be dedicated on June 15.

The central roads—of which the Lincoln highway and the National Old Trails road are the most prominent—are receiving a great deal of attention to put them in good condition. Massachusetts is expected this year to spend \$2,000,000 on the roads in the western part of the state.

\$200,000,000 SPENT ON ROADS.

Since the inauguration of the policy of "State Aid" for roads, which has been very widely adopted by the states, over \$200,000,000 has been spent in road improvement and 31,000 miles of good modern road has been produced, according to figures compiled for the 1915 Good Roads Year Book. Only seven states are now without some form of state highway department—Florida, Georgia, Indiana, Mississippi, South Carolina, Tennessee and Texas.

The movement for state aid began in 1891, in New Jersey, and spread rapidly to other states. The mileage of new state roads built in 1913 was 5000, and in 1914, 6000, which shows that more than one-third of the entire mileage to date was built in the last two years. This indicates that construction work in the future will be accomplished more rapidly.

ASLASKA ROUTE IS SURVEYED.

The proposed touring route from California, Washington and Oregon into Alaska has been surveyed and along the more populous sections of the route much construction work is being done. Of the four divisions of the road, that in California and Washington and Oregon are the most nearly completed. Construction work is going on all along the route. The route from Blaine, Wash., to Vancouver, B. C., has been definitely laid out and work on it will begin soon. The Yukon territorial government has planned extensive road work to improve existing roads and build new ones as soon as possible. When the work now planned has been completed an automobile route will be available from the semi-tropics of lower California to the "land of the midnight sun."

INDIANA BUILDS LINCOLN HIGHWAY.

A bond issue of \$174,635, to be used in building 14 miles of standard concrete road on the Lincoln highway across St. Joseph county, has just been passed in Indiana. The bonds are sold and work will begin as soon as favorable weather arrives. For the first mile to be built in Indiana, the Lincoln Highway Association has furnished 2000 barrels of cement, which is already on the ground. Noble and Elkhart counties are to build their sections of the road this summer, so that an unbroken stretch across three counties will be available by fall. Two years of hard work by the Lincoln Highway Association and the good roads organizations of Indiana brought about the progress that will be made this year.

MT. DESERT OPEN TO TOURISTS.

After a long battle, both legal and otherwise, in which the Maine legislature, the Maine Automobile Association and others engaged, Mt. Desert Island has been opened to the passage of motor vehicles. The other three towns on the island had capitulated some time before, but Mt. Desert retained its ban until the state legislature took part and set June 1 as the date on which the roads should be opened to motor traffic, although the town, by use of the referendum, had the power to refuse. It was finally decided to open on May 2, so as to permit horses to become used to automobiles before the heavy traffic of July and August sets in.

GERMANY USING NEW MOTOR FUELS.

When the German Bundesrat restricted the use of benzol and benzine (the European designation for gasoline) in motor vehicles in Berlin, the German motor operators and chemists began to experiment with substitutes. As a result, many technical men state, the more expensive motor fuels will not come into favor again. As a matter of fact, German motorists have been using a mixed fuel for several years with satisfactory results, which was obtained by mixing pure benzine with other oils, they being known variously as "mononaphtha," "automobile benzine," or "heavy benzine."

Benzol, a coal-tar product, would have replaced benzine a long time ago, it is stated, if the manufacturers of benzol were able to supply a sufficient surplus over their contracted exports. However, there are many motorists who still believe that benzol is harmful to motors. Experiments in mixing fuels are now being conducted in Germany. It has been found that by mixing benzine and benzol with petroleum four different homogeneous fuels can be produced, they being benzine-petrol, benzine-spirit, benzol-petrol and benzol-spirit. By mixing the four combinations fuels can be obtained that are composed of the three original fuels—benzine-benzol-petrol and benzol-benzine-alcohol.

The benzine-petroleum mixture has been found to require no changes in the ordinary motor, but when alcohol was added, it was necessary to attach a perforated lead disc to the float, and an especially effective warming mechanism was attached. Less satisfactory results were obtained, however, from mixtures of half benzol and half alcohol, and one-fourth benzol and three-fourths alcohol. It is stated that by the elimination of the radiator and some other changes it will be possible to use the last mixture.

WOMEN TO BE WAR CHAUFFEURS.

The Woman's Automobile Club of France, of which Mme. Jeanne Pallier is the leading spirit, is trying to induce the French government to permit the members of the club to act as chauffeurs of ambulances and other motor vehicles used at the front. Mme. Pallier is an aviatrix as well as a licensed automobile driver, and she has tried to secure a place as a driver of a military aeroplane also.

"I can imagine nothing that would be more inspiring to our soldiers in the trenches than to see their countrywomen flying over the enemy,"

she says. "There are plenty of women who have the strength, nerve and experience, but so far the government has been obdurate. There is the same difficulty now with regard to securing permission for the women to drive ambulances."

Among the 200 members of the Woman's Automobile Club are the Duchess d'Uzes, the first woman to obtain a chauffeur's license in France; Jeanne Cautelle Mendes, Helene Dutrieu, Louise Abbema and Marie Marvingt. The club desires to secure some American woman driver as honorary president.

GAS-ELECTRIC 'BUSES IN ENGLAND.

Gas-electric truck chassis made by the Tillington-Stevens Company, an English manufacturer, have been tried out as 'busses on London streets and have been found to be very satisfactory. The qualities that have won it favor are the abolition of gear shifting, with its accompanying jar, and the smoothness with which its speed can be accel-



Gas-Electric Propelled Omnibus.

erated or retarded. This flexibility of control has been found very desirable, for it minimizes the probability of traffic accidents as contrasted with gasoline motor cars.

The English, however, are not so familiar with electricity as Americans and the electric transmission is a considerable obstacle to the sales department in many cases. So the same firm makes also gasoline motor chassis for commercial, mail and military uses.

BERLIN OMNIBUSES PAY DIVIDENDS.

Despite the war and the fact that in 1914 the omnibuses of Berlin, Germany, were forced to carry 5,000,000 German soldiers free, the omnibus company was able to declare a dividend of 7½ per cent. This is more remarkable when it is considered that the war has caused the reduction of the motor lines by two-thirds.

GREAT INTEREST SHOWN IN "JITNEYS."

THE struggle of the street railway interests to overcome the "jitney" movement by political means is continued in nearly every section of the United States and Canada, wherever the use of the 'bus has developed. Occasionally extra legal means have been resorted to.

In Savannah, Ga., an investigation is being made of charges made by the "jitney" men and corroborated by some police officials that street railway conductors and motormen strewed the pavements of the main streets with cardboards through which tacks had been stuck with the points up. On that day a large number of the "jitneys" received punctures.

In Vancouver and Winnipeg the larger cities of western Canada, the "jitney" movement is

The street railway company has been very hard hit. It has reduced dividends and has informed the city council that it must reduce the number of cars operated and lay off a number of its employees. It is also considering an appeal to the courts on the ground that its franchise gave it the exclusive right to carry passengers in the streets. Efforts are also being made to regulate the "jitney" off the main streets onto those where no car lines are operated.

A "jitney" express line has been established between New London, Conn., and nearby towns. For articles weighing less than five pounds, five cents is collected and an additional five cents for each additional 10 pounds. The limit of weight is 105 pounds. Glassware, crockery and other breakables take a double rate and furniture, because of its bulk, a triple rate.

In the Cape Cod district of Massachusetts, where there are no trolleys and all passengers between towns have previously been carried by the railroads, an autobus system has been planned. The route will be from Buzzard's Bay to Falmouth to Hyannis and then through the towns on the south shore of the cape to Chatham, Orleans and Provincetown. The return to Buzzard's Bay will be made by the north shore.

The fight of the five-cent 'bus lines to get a foothold in New York City is continuing. Several companies are in the field to secure a franchise which will shortly be granted by the board of aldermen. The proposed franchise includes the provision that the companies must clean the snow off the streets on which they operate. This, the 'bus men say, makes operation impossible. They are to have the right, however, in submitting their bids, to suggest modifications of the franchise.

Opposition to the 'busses comes from the present street railways, the 10-cent 'bus lines that are already operated and from residents of the streets along which the proposed 'busses expect to run.

In Providence, R. I., where the city officials are permitted to regulate the "jitney" as they see



Kissel-Kar One-Ton Jitney Operated Between Santa Rosa and Healdsburg, Cal.

now as active as it is in the United States. There are about 500 cars operating in Winnipeg at present. Some of these are especially built 'bus types, although the majority, as elsewhere, are ordinary passenger automobiles.

Some cars in operation cater exclusively to women and children and will not carry men. Many are driven by women and these are said to be better patronized, on the whole, than those driven by men—either because of faith in the careful driving of the sex, or because of gallantry.

Winnipeg is exceptionally well adapted to "jitney" service. It is a new city and when it was laid out the streets were made 132 feet wide. This leaves 50 feet on each side of the car tracks and removes any possibility of the traffic troubles which the "jitney" has created in some cities.

fit, an ordinance has been proposed, but not yet passed, which gives the police large powers over the 'busses. It closes certain streets to them, gives the police commission the power to set their routes, and limits the carrying capacity to the seating capacity specified by the car manufacturer. It provides a license fee of \$5 for each seat in the 'bus and an indemnity bond of \$500 for each seat. Drivers must also be licensed after a road test at a cost of \$1.

The driver must not smoke while working, must not shout or call for passengers or use any mechanical device to advertise his presence. Neither must he stop within 40 feet of the stopping place of the cars of the Rhode Island Company.

The mayor of Reading, Penn., has promulgated orders that all passengers must be taken on and discharged at the curb, passengers must not be carried on the running board, only one passenger is allowed to ride alongside the driver, signs and obstructions must be removed from the windshield and no car must stop within 75 feet of a street corner.

Press departments of the street railways companies are supplying the newspapers liberally with news regarding the progress of the movement to regulate the "jitney" in all parts of the country.

RHODE ISLAND REPEALS LAW.

One of the last acts of the Rhode Island legislature was to repeal the 10-day clause against non-resident motorists, which aroused retributory legislation in adjoining states. That clause provided that non-resident motorists could not stay in the state and use the roads for a period exceeding 10 days, unless engaged in business in the state, without taking out a Rhode Island license. The step of the legislature will probably be followed by Massachusetts and New Hampshire, which now have similar provisions.

LOS ANGELES PROTECTS TRUCKS.

The merchants and manufacturers of Los Angeles, Cal., appeared in committee before the public safety committee recently and by their arguments influenced that body to drop its proposal to place a special license tax on motor trucks as a means of increasing funds for the upkeep of the city streets. In answer to the statement that the trucks were in large measure responsible for the destruction of the street sur-

faces, the secretary of the Merchants' and Manufacturers' Association rejoined with the statement that the fault lay in the method of construction and repairs. The merchants further stated that calls for donations and demands for taxes are already a burden, and an additional tax would be ruinous to their industry.

THE ORIGIN OF "JITNEY."

The origin of the word "jitney," which has baffled linguists since it began to be applied to the now ubiquitous 'bus, has been disclosed by a retired cavalry officer, George Washington Lee. He states that the original of the word is "jet-nee," used by the French speaking negroes of Louisiana to mean "nickel," and he quotes this verse from a negro chant to prove it:

Mettons jetnee dans la trou
Et parcourons sur la rue.
Mettons jetnee—si non vous
Promenez au pied nu.

Translated this runs:

Put a nickel in the slot
For a ride along the street,
Put a nickel in—if not,
March along on your bare feet.

"Jetnee," pronounced "jet nay," would easily be corrupted by inexpert tongues into "jitney"—and there you have the mystery explained, according to Mr. Lee.

WHEEL TAX ILLEGAL.

A decision of far reaching importance to motorists was recently handed down by the Illinois supreme court in a test case brought by a resident of Lincoln, Ill., who had refused to pay the city tax on wheels. Five years ago the Illinois legislature passed an act laying a tax upon motor car wheels, in addition to a tax already laid upon motor cars. The city officials of Chicago immediately began to realize upon the opportunity to increase revenues and since 1910 has collected more than \$3,000,000. The other cities of the state gathered at least as much more. Recently the Lincoln resident aforementioned determined to rebel against the double taxation, with the result that he was sustained by the court. The decision was based upon two points, that it is double taxation and illegal, and that the wheel tax conflicts with the motor law. This decision will probably have its effect upon motorists and legislatures of other states where similar taxation exists.

INDUSTRIAL HAPPENINGS AND COMMENT.

E. A. Deeds, formerly vice president and assistant general manager of the National Cash Register Company, has taken up the management of the Dayton Engineering Laboratories, of which he is president. C. F. Kettering, vice president, and until recently general manager of the company, will in the future devote his attention more especially to the engineering and production departments of the business.

The Donnelly Motor Equipment Company's estate claims were heard by Seaman Miller, special master referee in bankruptcy, New York City, May 6. The assignor, attorneys for the assignee and attorneys for petitioning creditors who held claims for services rendered the estate were invited to the meeting.

The Joseph Dixon Crucible Company stockholders attended the largest annual meeting of their history, April 19, at the company's office in Jersey City, N. J., 19,519 shares out of a possible 20,000 being represented. The board of directors was re-elected, and is made up of the following: George T. Smith (president), R. E. Jennings, George E. Long (vice president), William G. Bumsted, J. H. Schermerhorn (treasurer) and Harry Dailey (secretary). Albert Norris is the assistant secretary and assistant treasurer.

The Inter-State Motor Company, Muncie, Ind., was host at a dinner to 56 Indiana Inter-State dealers and

concern is expected to begin at once the manufacture of casings and inner tubes. It has capital of \$500,000 and will employ between 300 and 400 men.

George Crittenden, formerly sales and advertising manager of the Krit Motor Car Company, has become head of the sales promotion department of the Regal Motor Car Company, Detroit, Mich.

The J. G. Brill Company, Philadelphia, Penn., famous as builders of trolley and other types of railroad cars, is said to have secured a contract from the Russian government for 3000 motor trucks valued at \$3,000,000.

H. L. Whittemore, who recently directed the advertising of the O'Sullivan rubber heel, has been appointed advertising manager of the Autocar Company, Ardmore, Penn.

The Ford Motor Car Company is to build an assembling plant at Washington, D. C., during the coming summer. It will be a four-story building, 100 by 400 feet, and similar to the other Ford assembling factories in several other cities. This will make the 25th plant of the kind to be erected by the Ford company. It is stated that the company plans to erect assembling plants in Iowa and Kansas this year. Construction work is already begun on the Buffalo factory.

The F. S. Carr Rubber Company, Tilbury, Ont., Canada, has had plans drawn for an addition to its plant.



"Drive Away Day" at the Inter-State Factory, Where About 60 Dealers Met.

their friends, and one dealer from Ohio, on what is termed as "drive away day," which was arranged by the Kanouse Automobile Company, Indianapolis, Ind. The main purpose was to bring the dealers together, and after a visit to the Inter-State factory they drove away in 31 new Inter-State cars. A feature of the day was that every guest who accompanied the dealers signed up for cars before leaving the city. The present daily output of the factory is between 18 and 20 cars, which rate is expected soon to be increased to 25 a day.

A. R. Mosler & Co., Mt. Vernon, N. Y., maker of the Mosler spark plug, announces that it has completed the transfer of its plant to the new quarters, located on the border line between New York City and Mt. Vernon. In which the company will have more than four times the space of its previous factory.

The Studebaker Corporation, Detroit, Mich., is said to be anticipating its bonds from the exceptionally large earnings of the company during the past few months. Of the \$400,000 worth of bonds that fall due in May, 75 per cent. are said to have already been taken up, as well as a considerable proportion of those maturing March, 1916. War orders are said to have increased the gross business of the company by \$20,000,000.

The Locomobile Company of America, Bridgeport, Conn., is stated to be in the market for its own bonds, having offered 105 for 10-year sinking fund bonds maturing later than June 1 of this year.

Albert E. Gordon, vice president of the Gordon Rubber Company, Canton, O., has severed his connection with that company to become general manager of the Newcastle Rubber Company, Newcastle, Penn. The latter

The Republic Rubber Company, Youngstown, O., is said to have received an order for 10,000 truck tires for one of the warring nations of Europe. This order is a duplicate of one received in the preceding week.

The Independence Motor Car Company, Lima, O., is to be moved to Atlanta, Ga., according to W. A. Williams, designer and manufacturer of the Independence car. The company will build two machines, one of which will be the same \$1000 machine which the plant has been putting out for a number of years, and another that will be sold for much lower price.

The Puritan Machine Company, Detroit, Mich., has purchased outright the entire stock and assets of the Mondex Shock Preventer Company, and will supply dealers and owners direct from Detroit instead of New York City as heretofore. The Puritan company, under the direction of A. O. Dunk, its president, has shown remarkable activity in buying up the service and repair parts of automobiles not now being manufactured. Recently two floors were added to the plant, and arrangements have been concluded for a large five-story warehouse adjacent to the main building.

The Sheboygan Falls Machine Company, Sheboygan Falls, Wis., is said to have received orders for about 6000 six-cylinder engines for the Grant "Six," and consequently is now working on a two 10-hour shift basis. The working force since the first of the year has been increased from 85 to 200 employees.

The Elyria Tire and Rubber Company, Elyria, O., will shortly erect a brick and steel concrete plant, 80 by 100 feet, in which truck tires will be made.

TRUCKS DRIVEN BY INTERNAL GEAR.

AFTER devoting 18 months to a comprehensive study of the light delivery field, the Republic Motor Truck Company of Alma, Mich., began commercial production of its 1500-pound delivery wagon. It had previously put upon the market, after similar investigation, the two other units of the series, a 2000 and a 3000-pound truck. In all machines the effort was to secure a design that should be enduring and low in price. The 1500-pound wagon sells for \$995; the 2000-pound truck at \$1350, and the 3000-pound at \$1475.

The lighter truck is distinguished from the two larger sizes in that it employs the internal gear drive, while they are chain driven from sprockets on jackshafts. The Continental motor is used in all models, $3\frac{3}{4}$ -inch bore by $5\frac{1}{4}$ -inch stroke in the larger sizes and $3\frac{1}{2}$ by five inches in the smaller. The following description applies to all three trucks, except as hereinafter noted:

The motors are four-cylinder, water cooled, with cylinders cast en bloc, enclosed valves being located all on one side and operated by a single cam-shaft. Inlet and exhaust valves are interchangeable. Pistons are of extra length, and are fitted with four diagonally split eccentric expansion rings. The connecting rods are of I beam construction, made of .35 and .45 carbon drop forged steel. Cams are forged integral with the shaft. The crankshaft is carried on three main bearings and is drop forged from the same material as the connecting rods. It is tested for a tensile strength of 90,000 pounds to the square inch. Timing gears are helical.

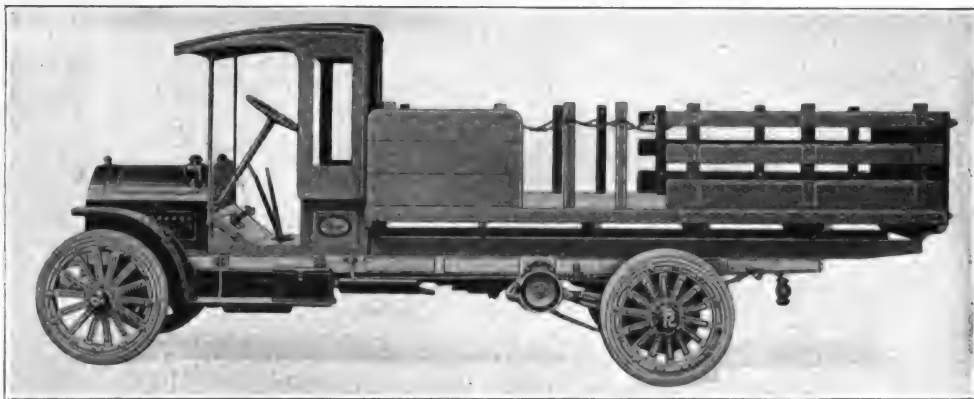
The dry-plate clutch of the multiple disc type has 12 plates. The gearset is of the selective sliding type with three speeds forward and one reverse. They are all heat treated. Fafnir bearings are used in the transmission. Drive is through two Hartford universals and a $1\frac{3}{4}$ -inch tubular shaft.

In the internal gear rear axle the entire load is carried on a drop forged I beam. The live shafts

and gears bear no weight. Spindle bearings are of especially ample size. The gear reduction is $6\frac{1}{2}$ to one. Service brakes are of the external contracting type on rear wheel drums, and emergency brakes are of the internal expanding type operating on the same drums. The front axle is a drop forged I beam with spindles of exceptional size and strength.

The front springs, having seven leaves each, are 38 inches long and $2\frac{1}{4}$ inches wide. Ten leaves make up the rear springs, which are 44 inches long and $2\frac{1}{4}$ inches wide. They are single shackled at the rear. Both sets are semi-elliptic.

Artillery wheels are fitted with Firestone tires. The sizes are 35 by $3\frac{1}{2}$ inches front and rear, when of cushion type. For \$50 extra, rear



The 3000-Pound Republic Chassis, Equipped with Standard Model F Body.

pneumatic tires 34 by $4\frac{1}{2}$ front and 35 by five inches rear are used.

The steering gear is of the worm and nut type, and is located on the left side. The steering wheel is 18 inches in diameter. The truck frame is 34 inches wide, but inswept to 31 inches between the front wheels. It is 182 inches long and $4\frac{1}{2}$ inches deep at the centre. The material is a $3/16$ -inch pressed steel channel section. Back of the driver's seat the length is 98 inches.

Wheelbase is 124 inches and tread 56 inches. The car weighs 2800 pounds. The standard color for the chassis is yellow with a Brewster green body. The gasoline tank has a capacity of 16 gallons. Equipment includes oil, tail and side lights, horn, tool kit, tool box, rear fenders and a flare board express body.

On the larger sizes, Eiseman magnetos and Stromberg carburetors are used. Fuel is fed by pressure feed. Engines are fitted with an auto-

matic governor, which controls the volume of gas supplied.

Instead of the multiple disc type, a leather-faced cone clutch is used. The Covert sliding gear transmission supplies three speeds forward and one reverse. The gears are nickel steel with one-inch faces. The drive is through a Russell full-floating jackshaft with the outer main bearings directly under the driving sprockets. Final drive is made through diamond roller side chains $\frac{5}{8}$ inches wide, with $\frac{3}{4}$ -inch rollers and a $1\frac{1}{4}$ -inch pitch.

A Driggs-Seabury frame, 34 inches wide, unswept to 31 inches between the front wheels, is employed. Front springs have eight leaves of alloy steel shackled at the rear and fitted with rebound bumpers. They are $37\frac{3}{4}$ inches long and $2\frac{1}{4}$ inches wide. The length of the rear

plied with the truck as standard equipment.

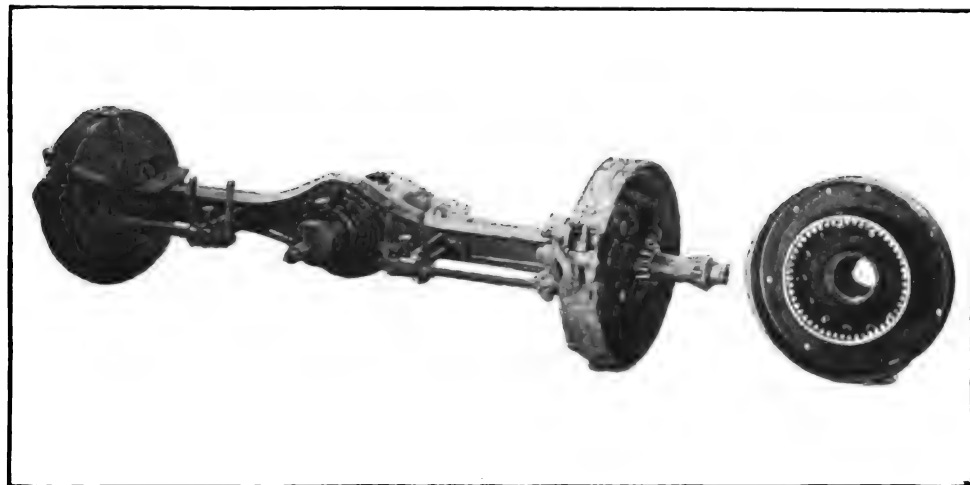
Chassis are made in two lengths, one of which supplies a platform 120 inches back from the driver's seat and the other 100 inches. The wheelbase is 144 inches or 124 inches. With all equipment the weight of the chassis is 3700 pounds. The gasoline tank holds 16 gallons. Standard equipment includes a driver's seat and cushion, front fenders, running boards, oil dash and tail lamps, horn, tool kit and tool box.

CAR TRACKS BAD FOR TIRES.

"There is no quicker way of ruining tires than by running them on the car tracks. The car rides easier and the jolts to the mechanism are less, but it is expensive comfort," says R. S. Wilson, manager of the service department of the Good-year Tire and Rubber Company.

"The tread of the tire is the thickest part because it is there that the wear takes place. The sides have a thinner wall of rubber to protect the fabric. When a tire is run in the car tracks wear is concentrated on the side walls.

"Running on the rails is a bad habit also of truck drivers. In that case only the outside edge of a



Rear Axle of Republic 1500-Pound Chassis Showing the Internal Gear Assembly and Wheel Drum.

springs is 46 inches and they are $2\frac{1}{2}$ inches wide with 12 leaves, double shackled and fitted with rebound bumpers. All springs are semi-elliptic.

The front axle is a Timken I beam. The rear axle is a Walker-Weiss, with rectangular cross section $1\frac{3}{4}$ inches by three inches. The length of the axle overall is 68 inches. Bower bearings are fitted.

A Lavigne steering gear of the worm and double sliding block type is used. There is an 18-inch steering wheel. Brakes are 10-inch external contracting on the jackshaft and emergency brakes are 14-inch internal expanding on rear wheel drums. Wheels are 35 inches in diameter with 14-inch spokes. On the front wheels $3\frac{1}{2}$ -inch tires are mounted and on the rear wheels five-inch. For dual rear tires an extra charge of \$50 is made. Firestone solid band tires are sup-

plied with the truck as standard equipment. This means that the width of the tire has been reduced and the same weight must be sustained on a smaller surface, so that the whole tire wears away much more quickly.

"Car tracks must be avoided if full tire mileage is desired."

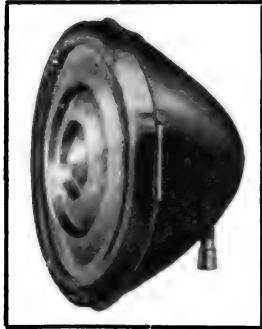
The Salt Lake Auto Club was recently organized to maintain interest in the automobile in Salt Lake City, Utah, furnish maps and logs of the roads in that vicinity, and draw the attention of tourists to that locality. The temporary directors chosen were: Clem Schramm, chairman; B. F. Redman, L. J. Gilmer, Frank Botterill and A. E. Tourssen.

NEW ACCESSORIES AND EQUIPMENT.

KLEARGLOW LIGHT DIFFUSERS.

Lamp Equipment That Does Not Lessen the Efficiency of the Rays, but Prevents Their Blinding Glare.

Recently a device was placed in the market by H. G. Paro, 30 North Michigan boulevard, Chicago, Ill., which is claimed has none of the defects and all the qualities desirable for thorough road illumination. The maker states that with this equipment the same volume of light is projected through this device as through any unprotected light, but the dazzling glare of the ordinary light is subdued. Lamps equipped with Klearglow are guaranteed to meet the requirements of the laws regulating the use of headlights which are in force in many cities.



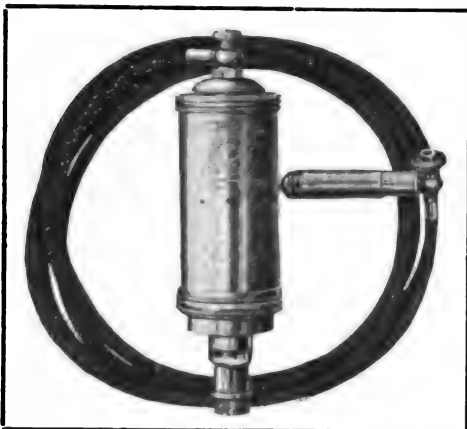
Light Diffuser.

The device consists of a combination reflector and fine glass distributor. The distributor is made of one piece of glass that is formed with corrugated circles, some of which have frosted facings which soften, but do not prevent the projection of the rays. Some of the rays from the light are projected through the frosted glass and others through the clear glass, with the result that the light of a lamp has much volume but no glare. The price of this diffuser is \$3.75 a pair. The glasses are made to fit standard lamps. Motorists and jobbers who desire literature and information of Klearglow lamp equipment may obtain it by addressing the maker and mentioning the Automobile Journal.

UTILITY PUMP AND WHISTLING CONTROLLER.

A New Device for Protection Against Over-Inflation of Tires, It Automatically Stopping Air.

A motor driven tire pump that is automatically controlled to predetermined pressures, is a new product of the Hill Valve Pump Company, 18-20 Kinzie street, Chicago, Ill.



Utility Pump, Complete with Whistling Pneu-Meter.

This device, known as the Utility Tire Pump and Pneu-Meter, consists of two units, one being spark plug pump and the other a controller that automatically closes the tire valve when the required amount of air has entered the tires, and also warns the motorist by emitting a shrill, hissing sound. The pump is easily attached and is provided with a flexible air tube that has been tested to a 1500-pound pressure before leaving the factory. In operation, the Pneu-Meter, which is located at the valve, turns off the supply of air to the tire and forces it through an opening, where it assumes

a loud whistling sound that can be heard at a comparatively long distance. This device can be adjusted to pressures ranging from 50 to 125 pounds. The adjustment is simple, and is accomplished by revolving its outer sleeve until the numbers thereon show the number of pounds required for certain sizes of tires. A table on the Pneu-Meter gives these pressures, which is a decided convenience to any motorist, the tables being accurate and the results of long experience in tire inflation.

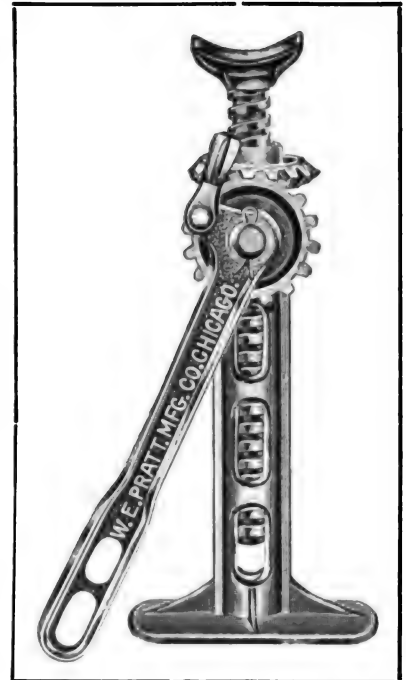
The complete device, including the Pneu-Meter, is sold for \$10 each, and is adaptable to any car. There is a smaller size, designated as the Utility Junior, which is intended for cars having smaller sized tires, and it is retailed at \$6 for the complete equipment. The Pneu-Meter can be bought separately, at \$2 each. When writing to the company, please mention this magazine.

LITTLE GIANT SCREW JACK.

Pratt Manufacturing Company Making a Small but Powerful Screw Jack for Autos.

The William E. Pratt Manufacturing Company, Chicago, Ill., which is widely known for its production of malleable iron castings, announces an addition to its products. It is a screw jack, which is being sold under the trade name of No. 00 Little Giant Screw Jack.

This device was designed to be light in weight, but it is stated that it will easily raise a motor car of medium weight. The Little Giant is claimed to be an advantage over many of the heavier jacks in that it will accomplish the same amount of work with a smaller amount of effort, and also that it is more convenient to carry in the car. Jacks are useful for a great many purposes, such as raising the wheels, applying pressure to various parts, etc., and as this jack has a lifting radius of six inches,



Little Giant Screw Jack.

it should be found a handy acquisition to any tool kit. As can be seen in the accompanying illustration, the construction of the device is extremely simple. It can be assembled or disassembled in less than a minute. As stated above, this company manufactures malleable iron castings and the beveled gears, jack's components, lifting lever, frame work, etc., are their own products. The large screw which passes through the centre of the frame is made of steel and is machine cut. A pawl, which is fitted to the lever, can be adjusted for either raising or lowering the device. The height of the Little Giant when closed is 10½ inches, and as it only weighs about four pounds, it can be conveniently carried in the tool box. The retail price of this device is \$1. Inquirers can obtain the company's literature, describing its products, by writing and mentioning the Automobile Journal.

NEW ACCESSORIES AND EQUIPMENT.

CLERO LONG PROJECTOR HORN.

Exceptionally Efficient and Loud-Toned Horn with Long Projector Sold at an Unusually Low Price.

The Clero Long Projector Horn, the product of the Fitzgerald Manufacturing Company, Torrington, Conn., is said to be not only the loudest, clearest and finest toned



Clero Long Projector Horn with Penetrating but Pleasant Signal.

horn on the market, but to be sold at a price that makes it distinctive among automobile signals of its kind. This signal does not require batteries to operate and needs no adjustment after it leaves the factory.

The warning sound from the Clero is produced by pressing an upright plunger, which is located at the top of the horn in the conventional manner. Its exceptionally long projector regulates the sound and produces a clear, clarion signal that is not offensive to others, but is an efficient warning to the unwary.

The low price of this device, which is \$4 retail, is made possible by the company's great volume of production and its advantageous manufacturing facilities. Only the best of material and workmanship enter into its make up. Further details will be given by the company to inquirers who mention this publication when writing.

KEMCO TWO-UNIT SYSTEM.

Combination Electric Starting and Lighting Outfit That Can Be Fitted to Any Standard Type of Car.

The Kemco Electric Manufacturing Company, Cleveland, O., is selling a complete starting and lighting system that can be attached to cars that are now in service. This is a two-unit system, and as it can be attached to practically any car, it is of more than passing interest to motorists. The starter is braced between the frame of the car in front of the radiator. When this starter is installed there are no gears or chains to attach, all that is necessary is to remove the hand crank. When the starting button is pressed a crank which is fitted on the starter is forced into mesh with the crankshaft. The electric motor then whirls the shaft around rapidly until the motor starts. This method of starting a car is claimed by the maker to be an advantage over most starters because it cranks the motor directly on the front

of the crankshaft, as has been explained.

The electric generator is a distinctive feature of the system. The dynamo is contained in the hub of the cooling fan and is driven by a silent chain or belt. The current of air developed by the fan tends to keep the dynamo cool, so that it can maintain a high and uniform speed and develop a constant current. There is no fear of an undercharged battery as the fan is always revolving and generating energy. The company makes two equipments, the one for large cars retailing for \$150, and one for medium cars selling for \$125. The complete system consists of a Kemco Universal Starter, fittings for attaching the starter to the car, a Kemco fan type dynamo, a bracket for supporting the dynamo, a current regulator, an ammeter, starting switch, lighting switch, Willard six-volt "LBA" battery, headlights, sidelights, tail light, Packard cables and all other necessary supplies as screws, bolts, nuts, etc.

The Kemco Electric Manufacturing Company guarantees every motor and generator which it produces to be free from electrical and mechanical defects for one year from the date of shipment.

THURBER ENGINE STARTER.

Pneumatic System That Is Positive in Action and Can Be Used for Tire Inflating.

Several years ago engine starters were looked upon as experiments, but today they are regarded as necessities and as one of the greatest improvements ever made

for gasoline engine operation. Many broken arms have resulted from careless or inexperienced cranking. Engine starters are operated by differing forces, and they may be actuated by compound levers, springs, compressed air, gas or electricity. The Northern Engineering Works, Detroit, Mich., is building a very efficient starter that is operated by air pressure and it is combined so that it serves as an air compressor as well. The pump and starter are a unit assembly, yet are so controlled that they operate independently.

Thurber Pneumatic Engine Starter.

When the starter is to be put in motion the driver presses his foot on a button, which releases the valve to the storage tank. The air then forces a crank into mesh with the crankshaft and turns the engine until it starts. As soon as the engine starts the starter clutch is disengaged and the device remains idle until it is again used. This company also furnishes an emergency hand crank with each starter, which is to be used to turn the motor slowly when adjustment is to be made on parts of the engine. By removing a small plate on the front of this starter the hand crank may be inserted without disassembling it.

The starter system may also be used for inflating pneumatic tires. This feature should recommend itself. Everybody knows the labor necessary to inflate a tire on the road by a hand pump. This task is made more disagreeable if the weather is hot or if it is raining. This system allows for the attaching of a hose on the dash. The starter turns the engine as when a crank is used. The connection is made at the front of the crankshaft, this insuring an even tension. The starter is claimed to be reliable under any conditions, as air is not subject to change even if submerged in water.

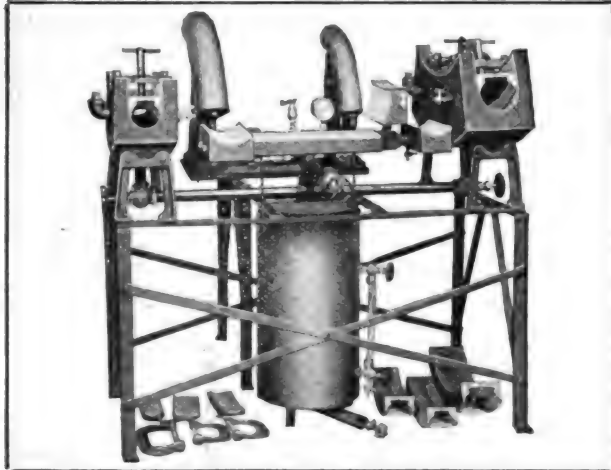
This company makes this starter and pump for all classes of cars and is making a Thurber Ford Special that is sold for \$65. The outfit is complete with all connections and necessary instructions.

NEW EQUIPMENT FOR THE GARAGE.

VANDERPOOL VULCANIZERS.

Ohio Manufacturer Makes a Vulcanizing Outfit for the Repair of Tire Cases and Inner Tubes.

When a tube or casing becomes torn or cut, the best method of repairing it is to vulcanize raw gum into the tear, which process consists of heating raw gum until



Vanderpool Vulcanizer for Repair of Casings and Inner Tubes.

it acquires elasticity and toughness. When a certain temperature of heat is reached it will change its nature and become part of the tire itself. A vulcanized patch cannot be peeled off by the heat which is generated in the tire while travelling.

The Vanderpool Company, Springfield, O., which has specialized in the manufacture of vulcanizing outfits for a number of years, is now making a vulcanizer known as the Two Cavity Combination. This outfit is the result of a comprehensive study of garage and repair shop requirements. It is equipped for vulcanizing any portion of the outer casing, as well as containing a plate for the repairing of tubes. Molds are also fitted for the repairing of clincher or straight side shoes. The equipment illustrated shows that its scope is very wide. Clamps, extra molds, etc., are furnished with this outfit. A tubular boiler, 12 inches in diameter, suspended from the top cross bars of the frame, can be heated either by a gas or gasoline burner, according to the desires of the purchaser. The Vanderpool vulcanizer is a complete equipment and there are no repairs too large or too small for it. The company will supply further information to inquirers, who should mention this magazine.

PORTABLE AIR COMPRESSOR.

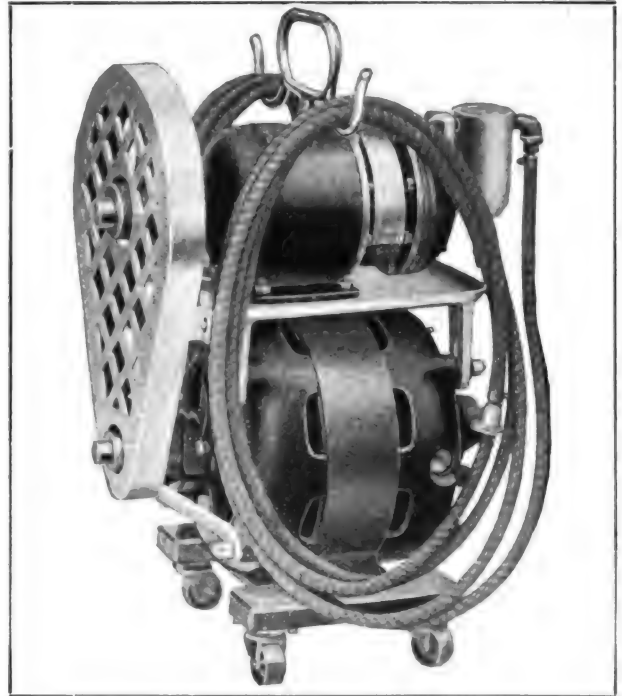
Portable Air Compressor That Develops 600-Pound Pressure and Is Different from Others.

A portable air compressor capable of developing a 600-pound pressure is one of the products of the Utility Compressor Company, Detroit, Mich. It differs from the ordinary compressor in that it has eight cylinders and that its pistons operate in a wave-like rocker motion. The piston rods are all connected to a rocker, which is pivoted to a universal joint, this joint being the company's special design. The smaller end of the rocker is engaged in the crankshaft at a distance from the central point sufficient to allow a rocking movement of 1 5/16 inches. The resulting wave-like motion imparts the power to each piston in turn. A steady flow of air and an even distribution of power is assured, there being a lead of a 1/4-inch between the pistons.

The driving arm, or crankshaft, is counter-balanced so as to offset the weight of the rocker, and the interior

mechanism is lubricated by a splash caused by a small blade attached to the bottom of the shaft. The cylinders are provided with valves at their heads, these valves having soft peened faces, which fit into hardened seats. The valves are held against the seat by a coiled spring arrangement, and, as they have an opening capacity of only .01 of an inch, they are absolutely noiseless in operation. Air is drawn into the cylinders by a stationary port cut in each member. Wearing effects, that might be caused by the rotary motion of the rocker, are minimized by the connecting rods, which are 2 1/16 inches in length, being fitted at each end with a hardened steel ball. A half-horsepower motor, which drives the crankshaft by a silent chain, can be furnished for alternating or direct current, in 110 or 220-volt types.

The standard equipment of the compressor, which is known as the Utility Portable Unit Model A 1, includes 15 feet of covered air hose, a like length of electric cable, socket plug and an oil separator. The separator is located between the compressor and the hose end to insure only pure air entering the tires. The equipment is mounted on two-inch roller casters, by which it can be moved to any place desired. It is finished in gloss black



Utility Portable Air Compressor, Unit Model A 1, Showing Complete Equipment.

enamel with brass and aluminum fittings, and is neat and compact. The company will supply complete data to inquirers who mention this magazine when writing.

OILDAG.

Graphite Lubricant Designed to Be Used with Usual Oil and Has Many Advantages.

The International Acheson Graphite Company, Niagara Falls, N. Y., is producing a lubricant which it is selling under the name of Oildag. This lubricant is a graphite product, and can be used with the regular lubricating oil. It is stated that the graphite is so fine that it will flow anywhere that the oil will go, and in tests it has been shown that it increases the compression of the engine and, therefore, increases the power of the motor. As most carbon is formed from decomposed oil, it is claimed that Oildag greatly reduces the amount of oil which en-

NEW EQUIPMENT FOR THE GARAGE.

ters the combustion chamber, thus reducing the carbon deposits. It is also said that the wear on the movable parts of the motor will be greatly reduced, as graphite forms an anti-friction surface and resists wear. The company sells this lubricant in a concentrated form, in cans that contain a sufficient amount to charge one, five, 10 or 50 gallons of oil. Full information can be secured from the company by mentioning this publication when writing.

SUPERIOR VULCANIZERS.

Two Types of Vulcanizers That Will Meet All Requirements in the Repair of Pneumatic Tires.

Lee C. Mapes, 16 Fulton avenue, Rochester, N. Y., manufactures a vulcanizer that is said to be capable of practically any repair work that a larger and more expensive one can execute.



Superior Vulcanizer No. 1.

In the process of vulcanizing, heat can be applied to the raw gum by several methods, but this company states that steam heat is the best, it being moist and uniform in temperature. The tire mold is carefully ground to have a smooth surface. The lower part acts as a boiler in which the heat is generated. It is said that every boiler is tested to 160-pound air pressure before it is allowed to leave factory. The heat is furnished to the boiler by a kerosene lamp stove of the standard wick type, the chimney of which is located in the bottom of the boiler casting. By this method the direct heat of the stove is obtained. A steam gauge, attached to the side of the device, has a graduated dial which registers to a 100-pound pressure, which is much higher than is necessary for vulcanizing.

These vulcanizers are made in two sizes, the manufacturer listing them as Superior No. 1 and Superior No. 2. The first mentioned is for small cuts on small tires and tubes, and is fitted with a single-burner stove. The second will make all repairs on four-inch and larger casings and tubes, and is equipped with a double-burner stove and will also repair rim cuts and retreading. The full equipment includes clamps and pressure plate. Model No. 2 is furnished in addition with two pressure bags for casing repairing. One roll of raw gum, one can of vulcanizing cement, one roll of combination gum, one box of mold dusting powder and an instruction book complete each set. Superior vulcanizer No. 1 retails for \$15 complete, while Superior No. 2 sells for \$25. Inquirers should mention this magazine when writing to the company.

MAYO ELECTRIC AIR PUMP.

Practical Equipment That Is Designed for the Private or Public Garage and Is Sold on Trial.

Among the many products of the Mayo Manufacturing Company, Chicago, Ill., that should merit attention from private and public garage owners is an electric motor driven air pump for the inflating of pneumatic tires. With this equipment the private owner can have a complete air pumping plant that the company warrants will be reliable and give permanent service.

The Mayo Electric Garage Pump is claimed to have all desirable qualities and several features of the company's exclusive invention. The finest of material is used in its construction and it is built to withstand the hard service that it will get in a public used plant.

The equipment consists of a Mayo two-cylinder pump,

which is driven by a silent chain from a quarter horsepower electric motor. The pump cylinders are fitted with water jackets and are kept cool by water from a water tank located over the electric motor that is circulated by thermo-syphon movement. To obviate any chance of burning out the motor by starting against too great a resistance, such as a tire already inflated to 50 pounds or more, the air is first pumped into an auxiliary tank underneath the pump. This tank is fitted with a check valve at the hose that connects with the tire, and a petcock which is automatically opened when the starting switch is turned off and releases the air from the tank.

When the motor is started the petcock will automatically close, there is no back pressure against the pump and the motor can be accelerated without harm. The entire equipment is mounted on a heavy oak base, the ends of which are grooved and dovetailed so as to prevent warping. This base is on two rear wheels and a movable front caster. These are made of malleable iron. A long handle is attached to the front caster so that the pump can be drawn wherever wanted. A spring clip holds the handle in place when not in use.

The pump is designed for heavy and constant duty and is small in size, but large in volume. The cylinder



The Mayo Electric Air Compressing Plant.

bore is 1½ inches and the piston has a stroke of two inches. The cylinders and the base are made of special quality die cast metal and are uniform in size. A large water jacket surrounds both cylinders and the pump can be driven 500 to 600 revolutions a minute without overheating. The crankshaft is forged, turned in a lathe and then ground to size. The connecting rod is drop forged and is constructed the same as are the rods used in an automobile motor.

The outfit is supplied with 10 feet of electric wire that has the required connections at the ends for attaching, and 10 feet of high-grade rubber tubing fitted with a pressure gauge and valve connection for fitting to the tire. The price is \$75 and it is warranted for one year. In ordering this equipment the purchaser should state whether the current is direct or alternating, and if a 110 or a 220-volt motor is required.

The company has a trial system of selling that is intended to afford the purchaser a personal knowledge of the article bought. The goods are shipped from the factory to an express agency, which in turn will notify the buyer that the goods have arrived. When the goods are delivered, the invoice price, plus the transportation charges, must be paid. The agent is authorized to withhold the money paid him for six days and if the goods are returned to him in that period because of dissatisfaction, he is to return the money to the purchaser, minus the carrier charges.

SUGGESTIONS FOR THE FORD CAR OWNER.

The Functions of the Cooling System and When It Largely Influences the Efficiency of the Machine—Effects of Heat and Friction in the Motor.

The 23rd article dealing with the construction, operation, maintenance, care and repair of the model T Ford chassis is devoted to a consideration of the cooling system and the necessity for its perfect functioning so that there will be that high efficiency that is so essential to economy.

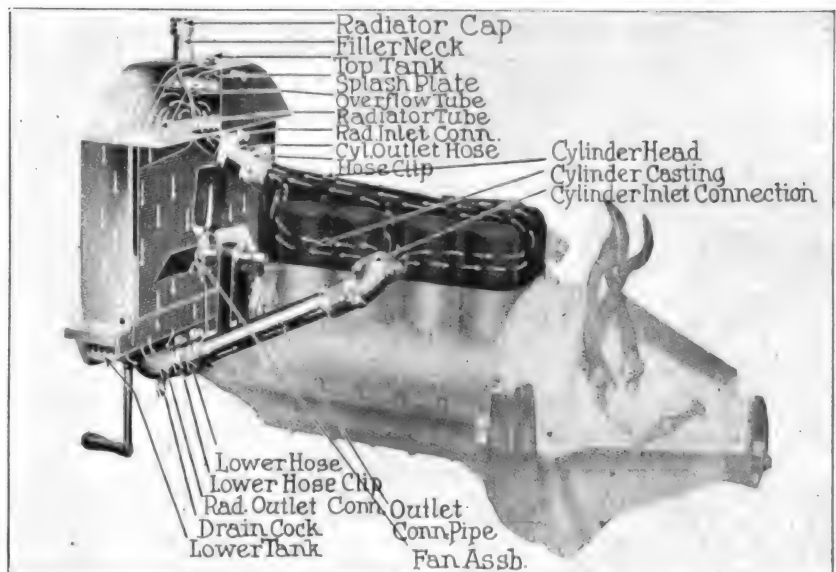
TEMPERATURE is the principal factor with which engine designers have to deal. Primarily the ambition of every engineer is to obtain the greatest efficiency from the consumption of a given volume of fuel. With the steam engine radiation is not a problem, other than means are always sought to prevent diffusion of heat by jacketing the pipes, cylinders, boilers and protecting them from the air. The internal combustion engine, especially if it is driven fast and is subjected to heavy loads, will become so heated that very great radiation is necessary for continued operation.

Obviously the ideal would be a variable system, which would have precisely the desired effect at every stage of operation. That is, if the engine were driven fast or slow the method of cooling could be adjusted so that the minimum ratio of heat would be dissipated and the greatest possible ratio could be applied to useful work. The statement has been made that not more than 20 per cent. of the power that was created by the consumption of fuel in an internal combustion engine could be devoted to useful work. This is a broad approximation, and while authorities vary, one of them gives the loss through the water jacket 52 per cent., the loss through the radiator, etc., 16 per cent., the loss through the exhaust 15 per cent., and but 17 per cent. that could be usefully applied.

Ratio of Heat Distribution.

There is no question that the ratio of heat distribution varies with the degree of compression

of the gas and the speed at which the engine is driven. So far as is known no rule has ever been applied, because there are so many variables that would have more or less influence, but exhaustive tests have determined that the range of loss of the total heat received by engines was from 25 to 50.4 per cent. in the water jacket and from 55 to 23.4 per cent. in the exhaust. Taking these figures at their face value one will note that the dissipation of heat by the water jacket and radiation will range from 65 to 68 per cent., and through the exhaust about 15 per cent., so that



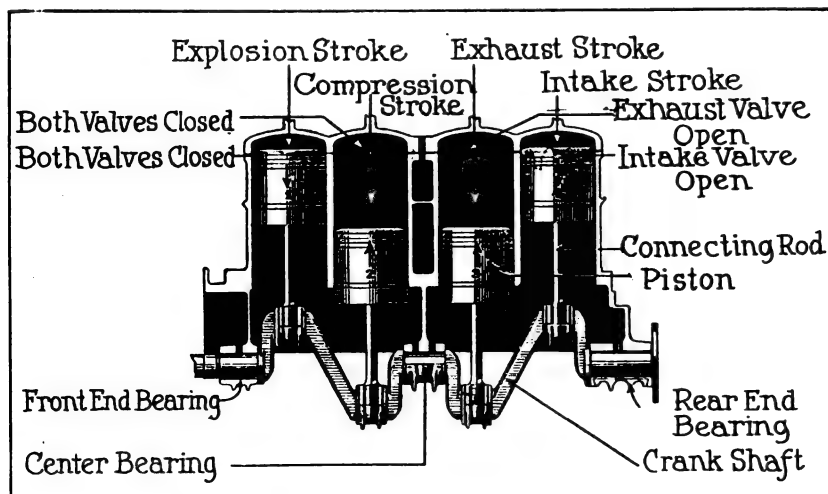
The Thermo-Syphon Cooling System of the Ford Motor, in Which the Water is Circulated by Gravity, and Which is Most Efficient Near or at the Boiling Point—Arrows Indicate the Direction of the Movement of the Water.

about 17 per cent. of the heat is really used. To put it another way, the heat that would develop 45 horsepower at the road wheels of a motor car, considering the frictional loss of power, would produce considerably in excess of 300 horsepower if all of the heat generated could be utilized.

Why Condition Is Emphasized.

The reader may not understand the reason why emphasis has been placed on the seemingly small ratio of power realized from consumption of fuel, and this statement is necessary. In prac-

tically every instance in which the tests referred to were made the engines were normally operative, and they were at least in what might be regarded as standard condition so far as efficiency was concerned. In fact there is little reason to doubt that they were in far better condition for the production of power than the average of the gasoline motors in service. If the ratio of heat efficiency was seemingly so small from these machines there is good reason to believe that it would be considerably smaller in engines that were not so well kept and which were given little or no attention. The conclusion must then be that any internal combustion engine to be economical of fuel must not only be well designed, but its functions ought to be to the highest degree that is practical from the viewpoint of careful attention and good mechanical upkeep.



The Relative Positions of the Pistons in the Cylinders of the Ford Motor at the Top and Bottom of Expansion Chambers at the Beginning of the Expansion Stroke in the First or No. 1 Cylinder.

The average motor vehicle engine is designed to be efficiently cooled and lubricated to the normal maximum operating speed. The majority of designers are inclined to provide excess cooling capacity because of the belief that if for any reason an engine was hard worked for any considerable period of time that a great deal of damage might result. As stated, the cooling system to be efficient must be heated to a point where it will most effectually distribute the heat, and if the water will circulate with sufficient rapidity a comparatively small volume of water will keep the temperature of a motor below boiling.

Systems of Water Cooling.

Water becomes lighter when heated and the hot water will rise and displace the water that is cooler until there is a natural or gravity circulation established. This movement will be propor-

tionate to the heat, the volume of water and the conditions in which it is confined. Water can be circulated by pumpage, which is known as a forced circulation, while the natural or gravity is known as the thermo-syphon system. With the former a given volume can be forced through stated water passages in a specified time, and the radiating influence can be computed on the rise in temperature of a specific quantity in a certain period, but the thermo-syphon system must have larger and more positive water passages through which the liquid will move by the influence of the heat.

High Temperature of Cylinders.

Thus in the designing of an engine a great deal depends upon the form and proportions of the water jackets. First of all the jackets must contain the volume of water that will effectively cool the motor, and all the cylinders ought to be surrounded by the same quantity. The jackets should be equal in capacity around the combustion and expansion chambers and about the valves, and the internal walls of the casting should be uniform in thickness, so that the radiation should be practically alike for all cylinders.

The average motor will have a compression of 60 pounds when the charge of fuel gas is fired, and the initial firing pressure will roughly be increased four times, or from 240 to 250 pounds. The temperature of burning gas will range from 2000 to 2500 in practise, probably averaging about 2250 to 2300 degrees, and the walls of the cylinders will be heated to perhaps 1000 degrees, which heat must be carried off in the water circulation. The water will absorb the heat proportionately to its movement through the passages. There is, of course, considerable frictional heat which is also absorbed, but this is not considered in the statements that have been made relative to the efficiency of the cooling system.

Automobile engine designers in determining the cooling system capacity must make provision for such excess as will probably meet all reasonable conditions of operation. The desirability of lightening the load that must be carried impels the reduction of the volume of water to the lowest consistent point, and the probability of excessive service requirements demands that

there be sufficient liquid to insure against heating to such a degree that damage to the motor would not result. Of course much depends upon the means for radiation, for the water will absorb the heat with extreme rapidity, and if this heat can be dissipated as rapidly as it is absorbed a very small cooling system will be necessary.

Water Quickly Absorbs Heat.

Because water will absorb heat so quickly the interior walls of the cylinder may be heated to a very high degree. Just as water in a paper can be boiled over a gas flame because the water will absorb the heat faster than the paper, so will the water of a cooling system absorb the heat in a cylinder that may be near the melting point of steel, 2560 degrees Fahrenheit, so that there will be no destructive influence on the engine and the lubricating oil may not be carbonized.

Were the extreme heat in a cylinder continuous there is no question that the cooling systems would have to be larger, but during three strokes of the cycle the temperature is diminishing. The initial maximum temperature is approximately soon after the piston has begun the expansion stroke, and as the gas is consumed the piston descends and the pressure is diminished. The exhaust valve is opened slightly before the end of the expansion stroke and this means a slow release of the pressure as the exhaust valve begins to lift, and after the upward or exhaust stroke is begun the valve opens very quickly and the pressure is rapidly reduced to slightly more than that of the atmosphere.

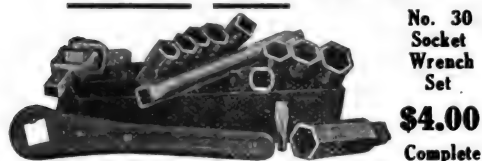
Effects of Good Combustion.

If the combustion in the cylinder is normal the gas is burned quickly, the expansion is practically all exerted in useful work, and there is little if any gas burned during any portion of the exhaust stroke. The heat is diminished with the expansion stroke and is lessened during the exhaust, while the admission of the fresh charge of gas for the suction stroke necessarily has a cooling effect, and the temperature is again lessened during the compression stroke. So the reader will understand that the periods of extremely high temperature are intermittent, being but a part of one stroke. The loss of heat by the exhaust is comparatively small, the greatest dissipation being through the cooling system. Speaking broadly, about 68 per cent. of the heat must be distributed by the water jackets and radiator, and when one understands that one of the cylinders of a four-cylinder engine is heated to its maximum the heat absorption necessary in a cooling system is apparent.

The water jackets of a well designed engine

Mossberg Guaranteed SMALL CAR TOOLS

O
S
S
B
E
R
G
•
G
U
A
R
A
N
T
E
E
D
•
T
O
O
L
S



No. 30
Socket
Wrench
Set
\$4.00
Complete



An ideal
set for
light car
users
\$2.00

Small Car Socket Wrench Set No. 17
Ford Reverse and Brake
Pedal Wrenches



12c
Single End

S. E. Reverse Brake and Cylinder Head Wrench No. 640
Ratchet Reverse Wrench



50c
Best
Adapted

Ratchet Reverse Brake Pedal and Tension Spring
Wrench No. 648, No. 7404.



The "Old Necessary"
10c
Ford Hub Cap
Wrench No. 650

Kit Wrench for FORD and Metz

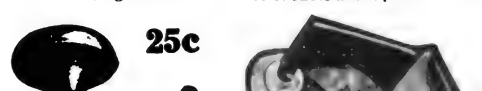


16c



Triple End Cylinder Head and Housing
Wrench No. 630

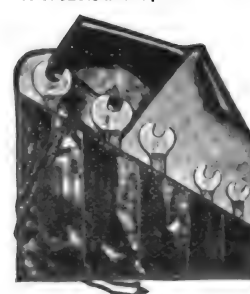
Almost indispensable on cylinder head and Axle
Housing Nuts because the sockets are tapered 26c



25c

Valve Grinder
for Ford

The Logical Valve
Grinder



FORD
Engineer's Set \$1.00

FRANK MOSSBERG CO.
ATTLEBORO, MASS.

If your dealer cannot supply you, we will ship prepaid on receipt of price. Send for Catalogue No. 171 E.

extend nearly if not quite to the base of expansion chamber, and the water is admitted to those usually at the base, so that the cooling influence will be greatest where the water passages are the smallest, and as the water rises in the jacket the flow will be around the cylinders and then upward. A glance at the accompanying illustration of a Ford motor system of radiation will be especially interesting. The radiator and the water jackets will contain approximately $4\frac{1}{2}$ gallons of water, and the radiator is so mounted that its base is considerably lower than the water jackets of the engine and the top is higher than the tops of the cylinders, so that with the radiator filled the water level is above the engine.

Water will always find its level and with the jackets filled the volume of liquid in the system considerably reduced, the engine is safeguarded if the water boils. The accompanying illustration shows the normal circulation of the water, which is by the gravity system. The heated water is ejected from the outlet manifold of the engine into the upper part or tank section of the radiator, and the cool water from the base of the radiator rises in jackets through the intake manifold. When the water has been heated to about 180 degrees the circulation will begin and it will continue with increasing strength as the temperature rises until it is greatest when the water is boiling.

The time required for the circulation of water through the engine is not a matter of importance, for the supposition is that there will be a sufficient volume in contact with the cylinders to prevent undue heating. Theoretically the greatest efficiency is just before the boiling point.

High Thermal Efficiency.

The best authorities are agreed that the conditions which appear to give the highest thermal efficiency in internal combustion engines are: 1, high temperature of cooling water in the jackets; 2, high pressure at the end of compression; 3, a rare mixture of fuel; 4, proper timing of the ignition system, and 5, a maximum load. The high economy of the rare mixture is probably due to the fact that high compression may be used with such a mixture, while with richer mixtures high compression pressures cannot be used without danger of preignition. Other things being equal, the hotter the walls of the cylinder the less heat is transferred into them from the hot gases, which means greater efficiency. With cool walls, however, there can be high compression without preignition, and high compression is a cause for high efficiency. Cool walls also tend to give the engine greater capacity, because with hot walls the

fuel mixture expands more on entering the cylinder, reducing the weight of the charge admitted in the suction stroke.

Efficiency of Radiation.

Obviously the cylinder walls of the Ford engine will absorb heat until the water will reach a temperature of 180 before the circulation will be begun, and as the rapidity of the movement of the water is proportionate to the degree of heat, the highest heat distribution efficiency is when the natural flow is greatest, or just before the water begins to vaporize. There is no question that the water in the cooling system of any Ford car can be made to boil if the engine can be worked to maximum capacity for a sufficient period, but besides the convection of heat from the water and radiator there is considerable distribution from the air that is circulated about the engine when the vehicle is in motion.

The heat in the expansion chamber of the engine is greatest, and yet this is absorbed by the water jackets that surround the cylinder walls, the combustion head and the valve pockets. This heat is exerted in expansive force directly upon piston head, which is not cooled, and this is in turn radiated through the head into the piston and thence to the crankcase. The oil that is distributed about the interior of the engine and which covers the cylinder walls, the piston internal and external walls, absorbs considerable heat, and this is radiated over an area that is very large as compared with cylinders.

Influence of Lubrication.

The statement has been made that one of the functions of the cooling system was to keep the internal temperature of the cylinders at a point where the lubricating oil would not carbonize or burn, and this is a very important factor, for if the lubricant burns and does not afford the effect that is expected of it, the result will be more or less destructive. In connection with this subject, which will be discussed to greater length in proper sequence, the reader should remember that the more the work of the engine—the larger the volume of oil that will be necessary. That is, that a specific quantity a revolution will not suffice, for the heat will be intensified and the consumption will be proportionately increased until perhaps several times the volume will be needed for very high speed as compared with low speed. This fact is very important in gas engine practice, for very few persons realize the necessity of lubrication greatly in excess of normal requirements if the work to be done is to be at high speed and long continued.

Of course the character of the lubrication has

some effect upon the cooling system, for with poor lubricity there is a greater degree of friction, and this not only causes heat, but if the temperature is high the result may be more or less destructive upon the engine cylinders, pistons, piston rings and valves.

In the designing of the internal combustion engine much depends upon the valve action. The valve ports must be sufficient in size and gener-

ally the larger the better—the valves must lift quickly and closely, slowly to obtain the fullest benefit of the suction and exhaust strokes, the fuel intake and the exhaust manifold must be of such size and form as to afford free passage to the gases, and the inhaust stroke ought to bring to each cylinder the same volume of fuel.

(To Be Continued.)

FORD CAR ACCESSORIES AND EQUIPMENT.

APCO VALVE STEM PACKING FREE.

Maker of the Apco Specialties Is Giving Away Samples of Valve Stem Packings Free of Charge.

In order to introduce as widely as possible its valve stem packings for Ford cars, the Auto Parts Company Providence, R. I., said to be the manufacturer of the largest line of Ford specialties in the world, is giving away a sample set free to any dealer or garage proprietor upon request. Because of the large demand expected, this distribution is limited to one set to a person or company. This valve stem packing is a necessary accessory for Ford car owners. The manufacturer explains that when the valve guides on an engine wear it is impossible to get a perfect mixture, as air is drawn through the space between the valve stems and the wall of the guides. This results in a skip that is impossible to find, especially at low engine speeds, and full power cannot be obtained from the engine, as part of the suction stroke is wasted by drawing air by the valve stems. The Apco packing consists of a special steel stamping and felt washer, which is held in position by a valve spring, as is shown in the illustration. The felt both prevents air from entering the cylinders, and also lubricates the valve stem and prevents further wear. A set of eight of these packings is priced at 50 cents, but a sample set will be sent by the company to those dealers and garage proprietors who write and mention this publication.



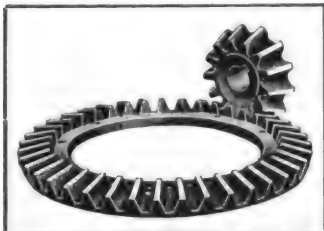
The Apco Valve Stem Packing.

The suction stroke is wasted by drawing air by the valve stems. The Apco packing consists of a special steel stamping and felt washer, which is held in position by a valve spring, as is shown in the illustration. The felt both prevents air from entering the cylinders, and also lubricates the valve stem and prevents further wear. A set of eight of these packings is priced at 50 cents, but a sample set will be sent by the company to those dealers and garage proprietors who write and mention this publication.

SPEEDING UP THE FORD CAR.

Master Gear and Driving Pinion That Increases Power at a Decreased Cost in Fuel Consumption.

The Detroit Radiator and Specialty Company, 957 Woodward avenue, Detroit, Mich., makes a gear set that can be easily applied to a Ford, and other touring and roadster cars, and increase the power of the engine without adding to the consumption of fuel. This is accomplished by equipping the car with the Detroit company's "More Speed" gear set, which changes the original ratio of the driving gear to that of the driving pinion, as can be noted in the accompanying illustration.



"More Speed" Master Gear and Driving Pinion.

These gear sets can be applied to the racytype or fast roadster car and a speed of about 60 miles an hour can

be obtained. The ratios for these types are from 2 4/7-1 to 2 3/4-1. For general driving in roadsters and touring cars the company recommends the 3-1 ratio; for light delivery Ford machines, and for exceptionally hilly or sandy country, a 4-1 ratio.

The gears are made of nickel steel gear stock, hardened by a special process, and they are guaranteed for one year against imperfect material or workmanship. The price of all ratios is \$15, and they can be secured from either the company or the nearest dealer or garage man.

JITNEY CURTAINS FOR FORD CARS.

An Equipment Which Will Allow the Curtain to Swing with the Door, and is Recommended for Jitneys.

The Jitney Curtain Company, 30 N. Ludlow street, Dayton, O., is manufacturing storm curtains equipped with the Blackmore curtain opener. Convenience is as-

sured by reason of there being no buttons or catches to unfasten when one wishes to enter or leave the car. The curtain bracket attaches to the door, which arrangement allows the door and curtain to swing as one unit. This factor renders the runabout or touring car equipped with top and side curtains as convenient for the passenger as is the costly limousine.



Ford Touring Car Equipped with Jitney Curtains.

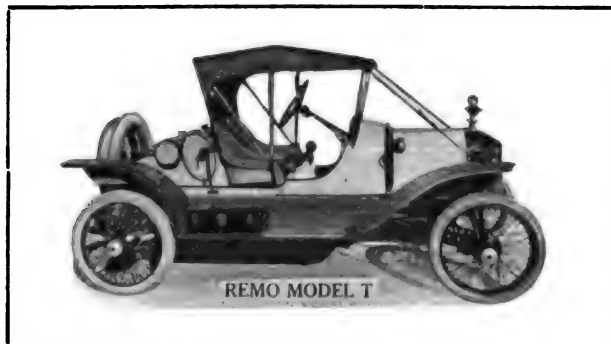
The company is now making these curtains, which are designated as "Jitney" curtains, for the Ford runabout or touring car. It is stated that this curtain opener has also been used, because of its many unusual qualities, on the 1915 models of Packard, White, Cadillac, Chalmers and Hupmobile cars, and it is expected that many more of the leading manufacturers will, in the near future, include them in the equipment of their cars. The curtain openers can be adopted to any machine and the present tops can easily be converted at a trifling expense by any top maker. They are attractive and afford complete protection and convenience. The equipment retails at \$1.50 a door curtain.

REMO FORD RACEABOUT BODIES.

Chicago Firm Manufactures Several Models of Convertible Bodies for Ford Automobiles.

As many Ford owners are remodelling their cars and equipping them for speed, and a more individual appear-

ance, the Auto Remodeling Company, 1503 Michigan avenue, Chicago, Ill., is manufacturing racytype Ford bodies. These are built in several models, and it is stated that



Ford Chassis Equipped with a Remo Model "T" Body.

only the best of workmanship and material is used. This company also produces a number of bucket seats, which give the car a racy appearance. The accompanying illustration clearly shows a Remo model "T" body fitted to a Ford chassis. An illustrated circular, which shows the various models and their prices, can be secured by anyone who writes to the company and mentions this publication.

CLARK AUTOMATIC SWITCH LOCK.

Fool-Proof Lock for Ford K. W. Switch Coil That Automatically Locks and Opens Only by Combination.

The Clark Lock Company, 57 Eddy street, suite 501, Providence, R. I., manufactures a switch coil lock that is absolutely fool-proof, automatically locks when the driver throws off the current, after which it can be opened only by the possessor of the combination, and can be operated in the dark. It can be locked either by hand or a slight push of the foot.



Clark Lock.

There is a wide range of possible combinations, reaching far up into the thousands, and this assures that no two locks are set to the same combination. While the combination for each lock is set at the factory, it is possible for the owner to change that arrangement and adjust to one of his own. The manufacturer states: "It is so simple that a child, having the combination, can set it in a jiffy, but a thief would have to work for a month to open it."

The Clark lock is designed to take the place of the ordinary key plate on the K. W. coil box. Its installation is extremely simple and can be accomplished in a few minutes by anyone with a screw driver. Simply remove the original switch plate by unscrewing the three holding screws, and place the Clark lock in position. It is made secure by three screws through the back of the lock entering the same screw holes made for the original switch plate, which arrangement eliminates possibility of defacing marks. The manner of adjusting the lock mechanism and the combination is fully and simply explained in a card accompanying each lock from the factory. When the lock is in position the holding screws are absolutely inaccessible, except to the person who has the combination.

On the back of the Clark lock is a key which permanently sets in the key hole of the switch in the coil box. This key is extended to a lever on the face of the lock, this lever being controlled by the five flat-sided keys seen in the illustration, which are the controlling members of the combination. The mechanism is absolutely sealed from tampering. It is possible to remove the casing by taking out two flat-headed screws, which are inaccessible except when the lock is open, they being covered by a steel slidable plate when it is closed. The com-

bination keys are flattened on one side so as to make it possible to operate them in the dark by sense of touch. The lock is highly ornamental, the covering being



Clark Automatic Switch Lock Assembled on K. W. Coil Box for Ford Car.

made of polished aluminum. The working parts are of steel and brass, and are made by the most expert of locksmiths. The lock is fully guaranteed and its price is \$5 complete. It can be obtained either from the factory direct or from dealers.

NEVILLE "MORE-ROOM" STEERING WHEEL.

Detroit Company Manufacturing a "Foldable" Steering Wheel for Ford Cars.

The Neville "More-Room" Steering Wheel Company, 714-16-18 Daird Whitney building, Detroit, Mich., is manufacturing a special adjustable steering wheel for Ford cars. As may be seen in the accompanying illustration, which displays the wheel in a tilted position, the device is a convenience when leaving or entering the car. The adjustable wheel is easily and instantly operated by pressing a button that releases a catch lock, after which the wheel may be raised out of the way.

When the wheel is fully tilted the catch lock will automatically lock and hold the wheel in place. Eight inches more room between the wheel and the seat than is possible when the wheel is in driving position is thus obtained. A touch of the button will release the lock and the wheel can be slid back to its normal position. This wheel can be attached in 15 minutes.

Two sizes are made for use on the Ford, a 15-inch plain, rim-ebony type, and a 17-inch corrugated rim-ebony model. The 17-inch type is two inches larger than the regular Ford steering wheel, and is only one inch closer to the windshield when raised than when in driving position. The wheel is furnished with an ebony-finished solid rim and has a polished aluminum spider, which is accurately machined so as to fit the regular Ford steering column.

The 17-inch wheel lists at \$6 and the 15-inch at \$5.50. The company will furnish full information to anyone who writes and mentions this publication.



Neville "More-Room" Steering Wheel.



Forty Miles of Tarvia Roads—

*Baltimore and Washington Boulevard,
Treated with "Tarvia B".*

The great automobile boulevard between Washington, D. C. and Baltimore, Md. is tarviated from end to end.

The Tarvia treatment has given the road a firm, waterproof, durable surface—free from dust and mud—and one that is not affected by the wear and tear of swift motor car traffic.

Another great Maryland state road—the Baltimore-Annapolis Boulevard—also is tarviated for about twenty miles of its twenty-eight mile length, and results have been most satisfactory.

Owing to its very low cost and satisfactory results, the Tarvia form of road treatment and construction is growing more popular every year.

Special Service Department

This Company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by anyone interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity the matter will have prompt attention.

BARRETT MANUFACTURING COMPANY

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati
Pittsburgh Detroit Birmingham Kansas City Minneapolis Salt Lake City Seattle

THE PATTERSON MFG. CO., Limited: Montreal, Toronto, Winnipeg, Vancouver, St. John, N. B. Halifax, N. S., Sydney, N. S.



(When Writing to Advertisers, Please Mention The Automobile Journal.)

PRACTICAL FACTS FOR NEW CAR OWNERS.

Unusual Features in Inter-State Roadster—Readers' Queries—Suggestions as to Repairs and Operation.

FOLLOWING a persistent demand by the trade and the buying public, the Inter-State Motor Company, Muncie, Ind., has added a road-

tents of a small steamer trunk, and is accessible either when the top is raised or lowered. Another unusual arrangement is that behind this compartment is another wherein two tires mounted on rims can be carried completely housed and protected from dirt, weather or from the light, which has a very deteriorating effect upon tires. Access to this second compartment is had through a door which drops and forms a part of the body when locked.

As stated above, the chassis is the same as used for the touring model. The motor is a valve-in-the-head type, four-cylinder, with $3\frac{1}{2}$ -inch bore and five-inch stroke, all push rods being located on the left side.

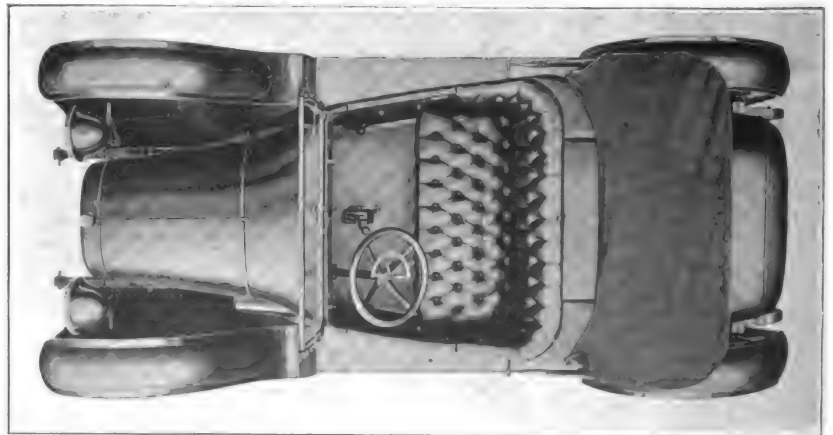
While the motor is rated by the S. A. E. formula at 19.6 horsepower, it is stated to have registered in dynamometer test 36.4 horsepower with the engine turning 1600 revolutions a minute. The valve mechanism and spark plugs are enclosed in an aluminum housing. The whole motor head is easily removable, which permits of access to pistons, valve seats, etc., without dismounting the cylinders. Below the head of the cylinder block the casting is en-



Inter-State Roadster, Showing Centre Location of Seat, High Protecting Sides and Graceful Streamline Design.

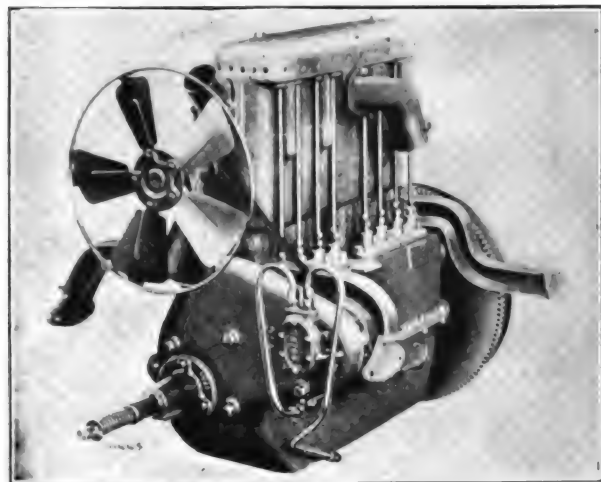
ster model to its \$1000 line of cars. The new model is built upon the same standard chassis as the Inter-State touring car, and possesses several noteworthy features.

The body itself is designed to have a streamline effect and has the full length of the touring car, it being mounted on a chassis with 110-inch wheelbase. The seat is located in the centre, which makes for easy riding, and is entered through doors on either side. The sides of the car are unusually high, which affords complete protection to the passengers. The instrument board is placed beneath a deep cowl in front of the driver. The seating compartment is exceptionally spacious, as will be noted in the accompanying illustration. It will also be noted that at the rear of the seat is a latch by which is lifted the cover to a compartment wherein can be stored the personal effects of the passenger. This compartment is large enough to hold the con-



Plan View of the Inter-State Roadster, Showing Baggage Compartment, Tire Compartment at Extreme Rear and Roomy Seat.

bloc and integral with the upper half of the crankcase, and there are liberal water passages in the head to afford free water circulation. The



Inter-State Motor, Showing Housing Which Protects Valve Mechanism.

motor is cooled by a thermo-syphon system.

The Remy starting and lighting system is used, the generator being driven from the timing gears. On the other side of the motor is located the starting motor, a separate unit, which drives through a spur pinion that meshes with a ring gear on the rim of the flywheel. The storage battery is mounted on the right side of the chassis frame and is very accessible.

The three-speed selective type transmission gearset is assembled as a unit with the rear axle, and it has nickel steel gears and shafts running on annular ball and Hyatt roller bearings. The same type of bearings are used in the rear axle, which is of the three-quarter-floating construction and has shafts of nickel steel. The drive is by pinion and bevel gears. Very reliable braking facilities are provided, the brake being unusually large and both acting on the rear axle. The service brake is foot controlled, and the emergency brake is operated by hand lever. The rear springs are attached directly to the frame with underslung suspension. They are three-quarter elliptic of heat treated English manganese steel.

The manufacturer has developed a chassis construction which makes for easy riding and convenient use, and especial attention has been devoted to

the distribution of weight and the proper proportioning of the load to the horsepower. As will be seen in the accompanying chassis view, the frame is strongly braced and of the "bottle neck" design, which affords small turning radius. The wheels are artillery type, with extra heavy spokes, and are equipped with Firestone demountable rims and Goodyear oversize 33 by four-inch tires.

A feature that is not usually associated with roadster models is the long running board and the high arched rear fenders, which are the same as used on the Inter-State touring car. The roadster also is provided with an extra wide double ventilated windshield, which increases the protection to the passengers. With the specially designed one-man top raised, the windshield and the extra high sides of the car afford almost complete protection from dust and wind, and to a large extent, from storms. The Inter-State roadster and touring cars are both sold completely equipped, with starting and lighting system, for \$1000.

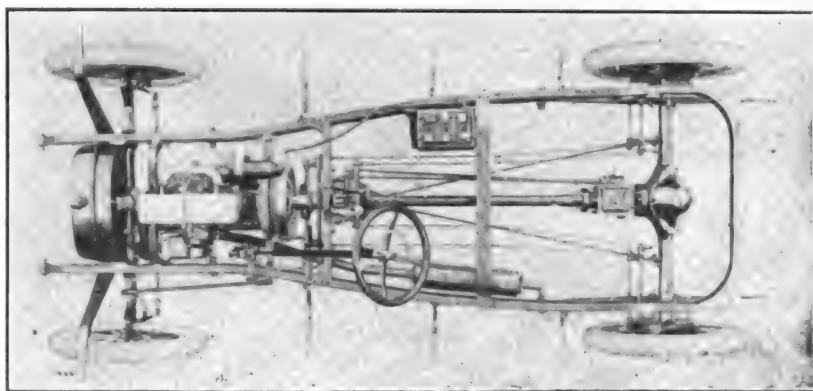
READERS' QUERIES.

Suggestions to Owners on How to Weigh Automobiles, Economical Use of Fuel, Proper Use of Spark Lever and Rules of the Road.

How to Weigh an Automobile—K. D. M., Baltimore, Md.

Can you suggest any method by which I can weigh my touring car, as I would like to learn the load carried on each wheel? I believe that the cause of tire trouble I am having is due to overloading, but I am at a loss to determine the ratio of weight the front wheels and the rear wheels carry.

It is always advisable to first obtain the exact weight of the whole car. If the wheelbase of the



The Inter-State Chassis, Showing Strongly Braced "Bottle Neck" Frame and Rear Transmission.

HARRIS
TRADE MARK REG. U.S. PAT. OFF.
OILS
AND
GREASES

GREATER EFFICIENCY AT LESS COST

No constant cleaning of soot deposits from cylinders; no difficulty in starting because plug contacts are gummed up with oil and carbon; no extra repairs from injury because of inferior lubricants.

What you do get is easier operation and a smoother running engine. In fact, greater efficiency at less cost results from the use of HARRIS OILS. They are made with the utmost care by experts—made from the highest quality Pennsylvania crude oil.

"A Little Goes A Long Way And Every Drop Counts."

We make a special oil for Steam Driven Motor Cars.

A. W. HARRIS OIL CO.
326 S. Water St.
Providence, R. I.

Branch: 143 No. Wabash Ave.,
Chicago, Ill.



ALDING PORCELAIN PLUGS



Regular
75c Value
50c
EACH


Write for a gallon of the famous
"ALDING" Oil, in "DUCK" Can, 75c Delivered
ALSTEN & GOULDING COMPANY
36 Foster Street, Worcester, Mass.

For Perfect Control and Safe, Comfortable Driving use

Weed Anti-Skid Chains

At all Reputable Dealers
WEED CHAIN TIRE GRIP COMPANY, BRIDGEPORT, CONN.

BRAENDER TIRES & TUBES



Are of the highest quality and the cheapest on mileage. They are built to last. Send for price list and particulars.

BRAENDER RUBBER & TIRE CO.
Main Offices and Factory, RUTHERFORD, N. J.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

machine will permit, it should be driven upon a platform scale such as is used to weigh coal, grain, etc. The central point of the wheelbase should then be found and a chalk line drawn at this point on the running board. Next weigh the rear end of the vehicle, which can be done by running the front part of the car off the scale until the chalk line is directly above the edge of the platform of the scale. The back of the car should then be run off the scale and the front end allowed to remain on, the chalk line again being brought to the edge of the platform. If care is taken in placing the car on the scale, the total weight of the two ends will not vary more than 25 pounds from that of the whole car. When weighing the car, it should be fully equipped, tanks filled and a passenger in each seat.

Wants Fuel Economy—P. F. E., Cabot, Ark.

I have a Maxwell "25" car that has a Maxwell special carburetor, and as it uses considerable gas I would like to know whether it would be practical to put on another carburetor, as I have a Schebler model D at hand. Would it be less expensive and as well if I put the Schebler carburetor on to use two tanks, one for gasoline and the other for kerosene? Can a transformer coil that has been burned out be repaired; or, as it is a two-cylinder coil, could I use one of the high-tension connections? The coil is a Splitdorf.

If the Maxwell special carburetor feeds too much gasoline it may be advisable to install the model "D" Schebler, which you now have at hand. I would, however, make sure whether the present carburetor will give a satisfactory mixture. If the adjusting needle is too widely opened the cylinders will draw a mixture which is absolutely unsuited to economic operation of the car. The adjustment can be tested by fully closing the needle valve and then opening it about a half turn. Start the motor and turn the needle until the car runs smoothly at low throttle. Then open the throttle wide and give the carburetor all the air that it will stand without popping. If the carburetor does not then give the desired result I would advise that you install the new carburetor.

I do not quite understand the reason that you wish to use a tank for kerosene and a tank for gasoline, but if you intend to use both fuels it will be necessary for you to start the motor on gasoline, as kerosene will not vaporize until the motor has generated a certain amount of heat. I would not want to state how the mixture would act in a Schebler, as it was not designed to carburete kerosene. Many refiners today are producing gasolines which test very low. The specific gravity may not be more than 65, and it will seldom if ever reach the standard, 76. If you intend to combine the two fuels I would advise that

you first ascertain the standard of gasoline you are now using. If you intend to use each fuel separately it will be necessary for you to run two pipe lines to the carburetor and also make provision for shutting off each one separately. As to the transformer coil you cannot use the high-tension connection without the low-tension connection, as they are part of the same coil. A burned coil can be repaired, but as a private owner has not the tools or the experience to do work of this kind, it should be sent to the factory that made it.

Two-Cylinder Motor Principle—J. L. H., Providence, R. I.

Will you please describe or illustrate how the four cycles are completed on a two-cylinder motor, as I have had many arguments on this subject?

In every four-cycle motor each piston must make four full strokes in the cylinder to cause one explosion or expansion stroke. In a two-cylinder motor the pistons are usually arranged horizontally and in both the inward and outward strokes occur at the same time. The accompanying statement will no doubt make the subject clear to you.

Cylinder No. 1.	Stroke Direction.	Cylinder No. 2.
Explosion	Inward	Suction
Exhaust	Outward	Compression
Suction	Inward	Explosion
Compression	Outward	Exhaust

Regarding this illustration: The four strokes must be made to secure a cycle of either cylinder, and the cylinders are diametrically opposed, or 180 degrees apart. As the crankshaft is turned the movement of each piston is the same in each cylinder—that is, the inward stroke is from the cylinder heads toward the crankshaft, and the outward stroke is from the crankshaft toward the tops of the cylinders.

As the explosion in No. 1 cylinder forces the piston inward the piston in No. 2 cylinder must have similar movement, and this must be the suction stroke for No. 2 cylinder. The second or outward stroke of the engine is carried by the momentum of the flywheel and this exhausts No. 1 cylinder and compresses the fuel in No. 2 cylinder, but there is no power exerted upon either cylinder. To the contrary, there is retardation from the compression of the gas in No. 2 cylinder. The third or second inward stroke of No. 2 cylinder is fired, this being the second power stroke of the cycle of two revolutions, and fresh gas is drawn into No. 1 cylinder. The fourth or the second outward stroke of No. 2 cylinder is exhausted and the gas is compressed in No. 1 cylinder.

Referring to the tabulation of strokes, it will be noted that the inward strokes are the power

When Writing to Advertisers, Please Mention The Automobile Journal.

Write today for
our Territorial Agree-
ment on the New
\$1,000
Inter-State
"FOUR"
The ONE popular priced car with
the greatest selling arguments
in the country
INTER-STATE MOTOR CO.
804 W. Willard St.,
MUNCIE, IND.

HEINZE
HECO
Model BX-4
HEINZE MAGNETOS are superior both mechanically and electrically. Equip with HEINZE and your Ignition requirements will be satisfied.
HEINZE ELECTRIC COMPANY
Factories—Lowell, Mass. Sales Offices—Detroit, Mich.
Branch Offices—New York, Detroit, Chicago, Minneapolis.
New England Agent—Arthur Patch Homer, Boston, Mass.

SAMPSON FOR INNER TUBES
PUNCTURE "It Plugs the Hole and It Hugs the Hole."
PLUG Quickly and permanently repairs the
"One little tool and your hands" is all you
require with it.
STEVENS & CO., 375 BROADWAY, NEW YORK

F. SHIRLEY BOYD
175 Massachusetts Ave., Boston, Mass.
R. I. V. Ball Bearings.
Baldwin Chains and Sprockets. J. H. Sager Line.

"Don't Gamble With Safety"
Demand the Improved, Guaranteed
S-M-C Asbestos Brake Lining
Sold by all dealers or direct by manufacturer
STAYBESTOS MFG. CO. Germantown, Philadelphia, Pa.

Subscribe to
THE ACCESSORY and GARAGE JOURNAL

HOTEL LONGACRE

Broadway & 47th Street

**More Like a Club Than a Hotel
Exclusively Bachelor**

Convenient to Everything. The refined air and good service of a club.

RATES PER DAY

50 rooms with lavatory... \$1.00
150 rooms with private bath 1.50
50 rooms with private bath 2.00
Two-room Suites, \$3.00 to \$4.00
Special Weekly Rates

Restaurant a la carte.

Club Breakfasts.

Dining room Open to Ladies.

**The best value in New York City
both in rooms and restaurant.**

Phone, 7790—Bryant
J. G. BOGGS.

Write for full
particulars



**Why Freeze Yourself?
Ruin Your Auto?**

**The Superior
Safe Garage Heater**

SAFE. NO FUMES.
NO GASES

Equipped with pilot light. No
matches, no danger, no discomfort.
An ideal positive heater.

SUPERIOR MANUFACTURING CO.

N. S. Pittsburgh, Pa.

The Fastest Sales
Car in the
World

MARMON

F. E. WING
862 Commonwealth Ave.
BOSTON, MASS.

New England Dealer for

NORDYKE & MARMON CO., Indianapolis, Ind.

MARMON "41"
\$3250

132" Wheelbase

MARMON "48"
\$5000

145" Wheelbase

REXO II \$3⁸⁵

The CARFORD MANUFACTURING COMPANY, 2546 Olive St., ELVIRA, O.
Successors to THE DEAN ELECTRIC COMPANY.

When Writing to Advertisers, Please Mention The Automobile Journal.

strokes of the pistons, and the outward strokes are "dead," that is, the momentum of the fly-wheel must be used to carry the pistons and compress the gas for firing. Incidentally statement may be made that the two-cylinder opposed motor is regarded by engineers as being the most perfectly balanced engine that is constructed.

WHY THE SPARK LEVER IS ADVANCED.

The inexperienced owner, as well as many more experienced operators, may not clearly understand why intelligent manipulation of the ignition spark lever is necessary, and for this reason are inclined to overlook the importance of setting it with relation to the engine speed. On most cars there is a position of the spark lever, usually at the centre of its range of movement, which corresponds to the normal firing point. When the lever is set at this position and the motor is running slowly, the charges of gas in the cylinders are being ignited when the pistons reach the top of the upward strokes. Then the gas is most compressed and when the spark occurs at this point the motor receives the greatest power impulse.

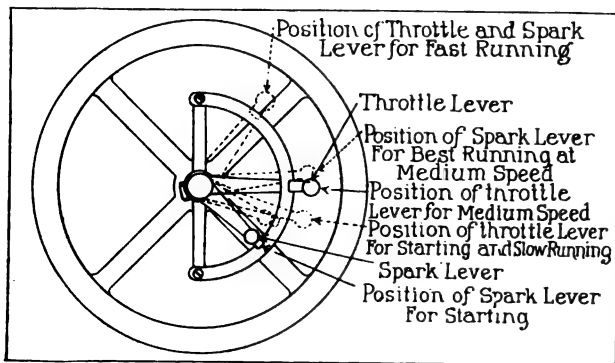
If the spark could be produced at the instant of full compression regardless of the motor speed, there would be no need of a spark lever, as the commutator could be permanently set at this point. This is not possible, however. The spark is caused by a current of electricity obtained from a mechanical generator, such as a magneto, or a storage battery, or dry cells. These produce a current of low voltage which must be transformed to one of higher potential, so that it may leap the air gap between the points of the spark plug. This transformation takes place in what is known as an induction coil. This consists of two windings, a primary and a secondary. The primary circuit includes the source of the current, the timing and the coarse windings in the coil, while the secondary circuit includes the fine windings in the coil and the means of distribution of the current to the spark plugs.

Considering the coil, when the current flows through the primary winding, it induces a current of higher potential in the secondary. The vibrator, which is an automatic circuit breaker controlled by the magnetic effect of the soft iron core, makes and breaks the primary circuit many times while the contact is made at the commutator. Each time the spring is attracted by the core the circuit is open. When the core loses its magnetism the vibrator spring is released to again make contact with the platinum tipped

screw. This closes the primary circuit and allows the current to again flow around the core. Each time the circuit is made and broken an electrical current is induced in the secondary circuit. The secondary windings, which are very small, build up the potential until it is strong enough to jump the air gap at the plug and cause a spark.

The action is somewhat similar with a low-tension magneto as the source of current, save that no vibrator is included in the system, the primary winding being incorporated in the armature and the transformer coil being located apart from the machine, usually on the dash or where it is conveniently accessible. When both the primary and secondary windings are contained in the armature the instrument is high-tension, that is, it intensifies the current.

It is quite evident that a certain amount of time is necessary to transform the current from the lower to the higher potential, and although this may be only the infinitesimal fraction of a



Sectional Plan View of Best Operating Methods in Using Spark Lever.

second, the time is always the same whether the motor be running at 100 or 1000 revolutions a minute.

The rate at which the piston travels varies, as for instance when the motor is cranked by hand the engine moves about 20 feet per minute, while at the other hand it may move as fast as 2000 feet a minute at high speed. When the engine is moving fast the piston is moving to correspond, and explosions are taking place very rapidly in the cylinder. For this reason it is necessary that the spark shall occur when the gas in the cylinder is at greatest compression. This is accomplished by what is known as advancing the spark. Manipulating the spark lever on the steering column moves the commutator, if a battery system is used, or the magneto contact maker if a mechanical generator is employed, so that the primary contact is made earlier, thus giving the coil

If you own a Ford car

You should write today for your copy
"The Key to Ford Efficiency"

It tells how to make your Ford a better car, how to give it the same ignition reliability as found in Packards, Locomobiles, etc.

Write today

THE BOSCH MAGNETO CO.

204 West 46th St.,

New York

THE JITNEY BUS

has established a new industry, involving millions of dollars and furnishing employment to tens of thousands of men. The industry is new, crude and unorganized, but growing by leaps and bounds. The Jitney 'bus is solving some transportation problems and revolutionizing others.

MILLIONS OF DOLLARS

will be made in the Jitney 'bus business. Here is a new industry that is growing faster than the automobile business or moving picture business did at a like age. Get posted and take advantage of this new live opportunity.

THE NATIONAL JITNEY

a weekly newspaper, published every Saturday, will tell you all about the Jitney 'bus business and what it is doing all over the world. If you drive a Jitney, if you want to buy or sell an automobile, if you want to make money in this new industry of the hour, send \$2 for one year's subscription, or \$1 for six months. Anyway, write today, enclosing 10 cents coin or stamps for sample copies.

THE NATIONAL JITNEY

1215 Phelan Building

San Francisco, Calif.

Raybestos
TRADE MARK
REG. U.S. PAT. OFF.

"THE ORIGINAL AND BEST ASBESTOS BRAKE LINING"

THE ROYAL EQUIPMENT CO., BRIDGEPORT, CONN.

DIXON'S GRAPHITE GREASE NO. 677

For Transmissions and Differentials

a mixture of selected flake motor graphite with the highest grade of mineral grease. Booklet No. 210 G.

Made in Jersey City, N. J., by the
JOSEPH DIXON CRUCIBLE COMPANY


Established 1827

G. 37

When Writing to Advertisers, Please Mention The Automobile Journal.

Meet me at the
Tuller

For Value,
Service, Home
Comforts




New HOTEL TULLER
Detroit, Michigan

Center of business on Grand Circus Park. Take Woodward car
get off at Adams Avenue

ABSOLUTELY FIREPROOF

200 Rooms, Private Bath,	\$1.50	Single,	\$2.50	Up, Double
200 " " " "	2.00	"	3.00	"
100 " " " "	2.50	"	4.00	"
100 " " " "	3.00 to 5.00	"	4.50	"

Total 600 Outside Rooms. All Absolutely Quiet.
Two Floors—Agents' Sample Rooms. New Unique Cafes and Cabaret Excellence



SPEDOLINE solves the problem of automobile and motor truck gear lubrication. One trial is all we ask. "A fair field and no favor" will demonstrate to your satisfaction that **SPEDOLINE** is the King of all lubricants for gears.

Henry H. Kroh, Boston Distributor.
MANUFACTURED BY
Continental Asbestos Corporation, Worcester, Mass.

MOTOR PARTS COMPANY
OFFICIAL
BOSCH DISTRIBUTOR

Zenith Carburetor Mohawk Tires Leak-Proof Rings

185-187 Columbus Avenue, BOSTON
818 No. Broad St., PHILADELPHIA SPRINGFIELD, MASS.

Peerless Quality in Smaller Size

"ALL PURPOSE" FOUR AND SIX
FOUR AT \$2,000 (Sixes \$250 Extra)

THE PEERLESS MOTOR CAR CO., CLEVELAND, OHIO

Makers also of the "48-Six" and Peerless Trucks.
Licensed under The Kardo Patents.

**AUTOMOBILE
ELECTRIC LIGHTING SPECIALTIES**

For the Automobile Owner and Manufacturer
who wants SERVICE for his money

ELECTRIC LIGHTING SPECIALTIES Made to Order
CULVER-STEARN'S MFG. CO.
Worcester, Mass. Detroit, Mich.

When Writing to Advertisers, Please Mention The Automobile Journal.

time to transform the low-tension spark to a higher potential and then distribute it to the plugs.

The spark may be advanced too far, however, and when this is done the explosion occurs before the piston has reached the height of its stroke, with the result that the piston must overcome the force of the expanded gas to complete the rest of the upward movement. This can easily be demonstrated on a small car when it is climbing a grade. The motor will knock, but when the spark lever is drawn back a little way the engine will stop knocking and will pick up more speed. In handling the spark lever it is necessary to consider the speed of the motor. When starting the engine the lever should always be set in its retarded position and after the motor has been started it should be set in the centre of the segment. It should be left in this position for all speeds up to 20 miles an hour and after that it should be advanced in ratio to the speed. Experience only can teach the driver the correct position of the spark, as the position of the lever will depend upon the engine speed and the condition of the road.

SIDE PLAY IN CONNECTING RODS.

More than one owner has been astonished to find a new connecting rod burned out or broken through the cracking of the babbitt. Cracking is not always resultant from poor material, as is usually believed to be the case. End play in connecting rods is essential because the alignment between the central axis of the cylinder and that of the rod is not always true. If the alignment is not perfect and no end play has been allowed, the result will be an uneven strain on the bearing, which will oftentimes cause it to crack. The space allowed for the end play also catches considerable oil from splash distribution in the crankcase and feeds it to the bearing. If there is no end play and the bearing is tight, there is danger that the oil will not feed to the bearing fast enough and a burned bearing will result.

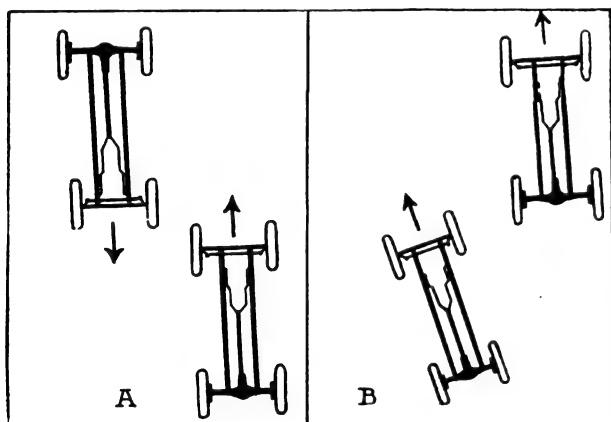
JACKING THE REAR WHEEL.

Many motorists when they obtain a puncture on a rear tire have acquired the bad habit of raising the wheel by placing the jack under the truss rod which supports the axle. This practise is inadvisable because the rod, if it becomes bent, cannot have an even tension on the rear housing. Truss rods are placed under the rear construction for the purpose of preventing the differential

housing from sagging and carrying the driving shafts out of alignment. If the truss rod is bent it will be springy and will not serve its purpose. Rear wheels can usually be raised by placing the jack under the spring clips, but if it is absolutely necessary to jack under the truss rod, a block should be fitted between the rod and the housing to take the strain.

RULES OF THE ROAD.

Many experienced drivers do not know the customs of the road, that is, so far as courtesy and legal requirements obtain, and there are those who have really little conception of what are, or should be, universally observed rules. Motorists are, as a rule, a law-abiding class and only the reckless will refuse to comply with any regulation. There are customs that have been adopted by motorists which the laws do not re-



Sketch Showing Legal Requirements Regarding Passing Vehicles.

quire them to observe. These customs are, however, regarded all through the United States. When two vehicles proceeding in opposite directions meet, it is the law that both vehicles shall keep to the right, each turning to the side from the centre of the road, as shown in Fig. A. If one of the approaching vehicles be horse drawn and should be heavily laden, or the driver could not for some valid reason have the centre of the road, or yield space as readily as the other, common courtesy will prompt the motorist to allow that vehicle to continue on, even though it be contrary to law, and pass by, going clear to the right or left of it.

The motorist should remember that it is easier to pass over the poorer surface of a highway by mechanical means than it is for the vehicle that is drawn by horses. In overtaking slower

KEEP THE HOOD DOWN
USE

Polarine

the standard oil for all motors.
STANDARD OIL CO., OF NEW YORK

Principal Stations

New York
Buffalo



Albany
Boston



WHY USE INFERIOR PLUGS WHEN CENTERFIRE

can be bought at the same price? They overcome all Engine troubles, fire where others fail and Add Power to engine. Any length point desired made to order. Try them and you will use them—always. Make a trial and save money. \$1.00 each, 6 for \$5.00.

GUARANTEED

Agents wanted and special prices to dealers.

Milwaukee Auto Specialty Co.
705-707-709-711 Chestnut St., Milwaukee, Wis.

American Made for American Trade

**New Departure
Ball Bearings**

**THE NEW DEPARTURE MFG. COMPANY,
BRISTOL, CONN.**

TEXACO MOTOR OIL

When Writing to Advertisers, Please Mention The Automobile Journal.

DIXIE 20TH CENTURY MAGNETO

An automobile without magneto ignition is inefficient in that its real power possibilities are never realized by the owner.


SPLITDORF Electrical Co.
NEWARK, N. J.

(All SPLITDORF features are fully covered by patent or patents pending)



BALL BEARINGS REGROUND
at one-fifth the cost of new, also New Single Row Annular, Thrust, New Departure Double Row and Radax Bearings.

AHLBERG BEARING CO.
Boston Chicago Detroit
New York Los Angeles Cleveland



VALVOLINE OIL CO.
Heavy, Medium and Light
Automobile Oils
27 STATE STREET BOSTON, MASS.

***Hartford**
SHOCK ABSORBER
SOOTHES THE ANGRY SPRING
Hartford Suspension Co. Jersey City, N. J.
*Formerly Truffault-Hartford.

SUBSCRIBE TO THE MOTOR TRUCK

(When Writing to Advertisers Please Mention The Automobile Journal.)

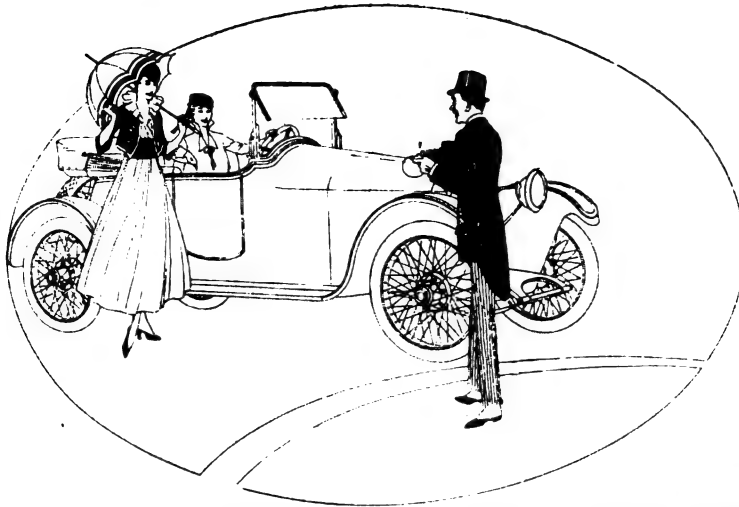
vehicles travelling in the same direction, the law requires that the faster going vehicle shall pass at the left of the other. It is mere courtesy and not law that requires that the motorist shall not hold the road to the exclusion of other travellers, but shall keep on the right of the road so as to permit any faster travelling vehicle to pass, as is indicated at Fig. B.

It is a proven fact that more accidents are resultant from vehicles crossing in front of others than from any other cause. Excessive use of the horn is positive proof that the operator is a novice and as such unnecessary warning may confuse people or frighten horses, it may be better not to use the horn until there is absolute need.

There are no accepted rules as to the meaning of horn blasts, but it is generally understood that the prolonged sounding indicates that the car in the rear wishes to pass and desires a clear road. Extending the arm horizontally indicates that it is the intention of the driver giving that sign to make a turn or bring his car to a stop. The following cars should reduce speed and relay the signal to the cars behind. Any condition where one may not be absolutely safe in going ahead is the best of reasons for an immediate stop. The same statement applies when there is any doubt as to the direction an approaching vehicle may be turned, as one ought never to gamble with safety. There are laws in some states that require an automobile to stop as soon as the driver of an approaching horse drawn vehicle holds up his hand. Even though this is not a law in some states, it is not wise to disregard the custom, as many drivers of timid horses are given much assurance by this signal. When driving along country roads after a storm that has caused mud, it is the custom to slacken pace or even stop when nearing a pedestrian, so as not to splash mud on them.

RADIATOR FILLING HINT.

When a pump is used to circulate the water in the cooling system of a car, it is advisable when filling the radiator for the first time, to pour the water in until it reaches the top of the radiator filler. The engine should then be turned over several times, so as to insure the water reaching and filling all parts of the system. If the motor is not turned when the water is poured into the radiator, the pump may be an obstruction in the water jacket intake manifold and possibly prevent the water from reaching the cylinders. Should the intake be so obstructed when



Charm

is an attribute of beauty so subtle that it cannot be caught by camera or brush, and is that finishing achievement in art which distinguishes the masterpiece.

Scripps-Booth



design has about it a final atmosphere of personality and appeal which no camera can reproduce—a final touch to the apex of mechanical excellence—giving to Scripps-Booth luxurious light cars a charm and a value hitherto

undreamed of in light weight construction.

It is a pleasure for our dealers to explain Scripps-Booth features and exclusiveness. A visit to their salesrooms will give you pleasure.

SCRIPPS-BOOTH COMPANY, DETROIT, MICHIGAN

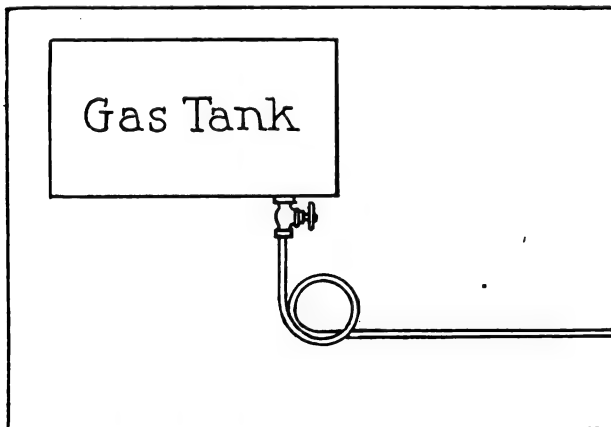
the motor is started the water will be carried to the cylinder jackets, but the system will not have the full supply of water it would have had the engine been turned over and more water added.

REPAIRING LEAKY GASOLINE PIPE.

Although happening very rarely, no mishap is more annoying than breaking a gasoline supply pipe on the road. Sometimes the crack in the

fuel pipe will extend for many inches and it may not be easily located. The fuel may rapidly leak away, although enough passes to the carburetor to keep the motor running.

When such an accident happens the pipe must be closely inspected and the crack located. Take a piece of heavy wrapping paper and cover one of its surfaces with plain yellow soap and then wrap the paper with the soap coated surface contacting with the metal around the pipe, allowing it to overlap the crack by several inches at either end. The paper should then be securely bound to the pipe with string or wire, or electric tape may be used, providing that the gasoline cannot come in contact with it. The vibration of the car generally is the cause of the pipe cracking and if the pipe cannot be repaired and must be replaced, the piping should be about one foot longer than the required length and then bent in a loop as is illustrated. This loop will serve as a spring for the pipe and will absorb the vibrations of the car and prevent the crystallization of the metal.

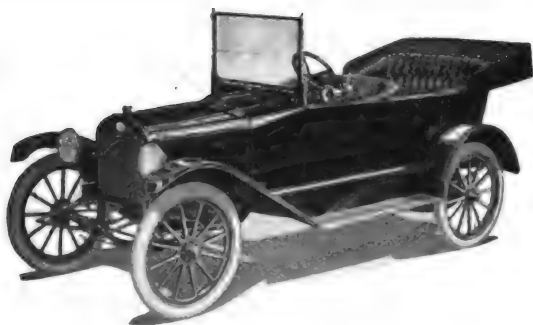


Gasoline Tank Pipe Looped to Minimize Vibration Effects.

(When Writing to Advertisers Please Mention The Automobile Journal.)

LINING FRONT WHEELS.

Once a month at least it is advisable to line the front wheels to make sure that they are run-



METZ "25"

The Quality Car

\$600 Equipped Complete, including Gray & Davis Electric Starter and Electric Lights, Instant One-Man Top, and Built-in Rain Vision Wind Shield.

IT PAYS to cater to the popular demand. The prospective buyer knows that quality can be obtained in a really low-priced car, and is looking for it. The new METZ Touring Model solves the problem completely. It is a strictly high grade car, with standard equipment throughout. Every one you sell means more sales—it gives entire satisfaction. Please your customers, make them sales agents for you. Write for Dealer's particulars and new catalog "Q."

METZ COMPANY, WALTHAM, MASS.

EISEMANN

The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.

The Eisemann Magneto Company

Sales and General Offices,

32-33d St., Brooklyn, N. Y.

New York, N. Y. Indianapolis, Ind. Detroit, Mich.

123 W. 52nd St. 415 N. Capitol Av. 802 W. d'Av.



DOVER ELECTRIC LIGHT BULB CASE

(Pat. Applied For)



It Will Carry Extra Bulbs Safer Than the Ones in the Lamps of the Car.

Send for New 1914 Catalogue

DOVER STAMPING & MFG. CO.,
(1) Cambridge, Mass.

ning true. A car may have a wheel out of alignment, caused by striking a curbing, for great pressure is not required to bend a wheel spindle, a condition that may not be noted until test is made. As the tie bar which connects the steering knuckles of both wheels is adjustable, the wheels can be made to align and to have correct relation with practically no trouble.

LUBRICANTS FOR TIRE TUBES.

Experience has taught motorists that over-size tires on an automobile always give the best and the longest service. In handling tires care should always be taken to avoid getting oil or gasoline on the tubes. One of the principal causes of tire tube deterioration is heat, which is generated by friction of the shoes on the road surface. This cause can be easily determined by placing one's hand on a shoe immediately after it has been driven a considerable distance at fair speed. Usually when a tire tube is purchased the dealer will provide with it a small package of powdered soap stone, to be placed between the tube and the shoe. Many motorists use talc or similar mediums to eliminate or minimize friction between the tube and shoe. One of the best non-conductors of heat which can be used between the tube and the shoe is flake graphite. This will make the tube fit better and easier in the shoe and is positively not injurious to the rubber, the only fault being the color.

REMEDIES FOR SLIPPING CLUTCHES.

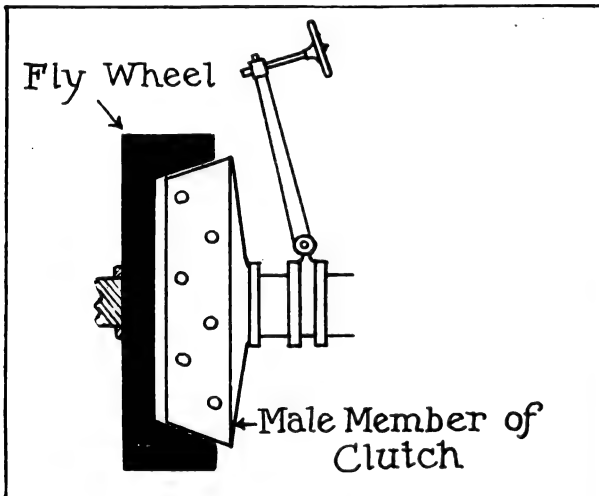
In most forms of speed changing devices, except planetary and friction disc types, it is necessary to interpose a clutch between the engine and the transmission system so that the motor may be disconnected from the gearset before shifting gears. Clutches are made in many forms, but one of the most common types is the cone, which consists of a male and female member. As can be seen by the accompanying illustrations, the female member is often formed directly in the fly-wheel rim, while the other portion is a separate casting, which is faced with a frictional material.

If a cone clutch has been properly designed the only parts to wear will be the leather facing and the bearing surface of the male member where it revolves on the shaft. The leather facing of the male member should always be given care, as it may become hard or charred because of slipping, which generates intense heat. Any wear at the bearing surface of the cone hub will cause the cone to sag when the spring pressure

(When Writing to Advertisers Please Mention The Automobile Journal.)

is released and will also cause the clutch to drag, as the parts will still be in partial contact. If the leather facing should become so worn that the rivets are exposed, the clutch will slip and the surface of the female member will become scored and roughened.

Two of the most common troubles of this type of clutch are harsh engagement and slipping. If the frictional facing is in good condition it will be a comparatively easy matter to restore efficiency. Slipping is often caused by the frictional material becoming coated with oil, reducing the co-efficient of friction to a low degree, so that the tension of the main spring will not be strong enough to maintain sufficient friction of the cone faces. This surplus of oil may be removed in many ways, but one of the most efficient is to coat the surface with Fuller's earth. Borax has also been used to absorb the oil with



Cone Type of Clutch. Showing Assembly of Male and Female Members.

good result, but never use resin, although recommended by some. Resin may serve for a while, but should the clutch slip the heat would melt the resin, which in liquid form will become a lubricant, and the effect will be as if the clutch were oiled.

If a clutch of the leather faced type should grip too harshly, it will be generally found that the leather has become hard and will not yield when brought in frictional contact with the female member. To secure gradual contact between the male and female parts, the frictional surface of the male member should be soft and elastic. If the facing is not charred or much worn, it may be restored by rubbing into it a small quantity of neatsfoot or castor oil, which will soften and make it more elastic. Never allow a clutch to slip at any time, as a slightly

HOTEL MAJESTIC

Central Park West at 72nd St.,
New York

Copeland Townsend, formerly Manager of the Hotel Imperial, New York, is now proprietor of the Majestic.

Overlooking Central Park and away from the noise and heat of lower Broadway, the Majestic offers to motorists a haven of quiet and rest after a tedious journey. During the summer season small suites consisting of sitting room, bedroom and bath may be secured at very low prices.

The Cafe Moderne and the roof garden offer dancing nightly.

NOTICE FOR OWNERS AND CHAUFFEURS:

Coming into New York via Broadway, or down Fifth Ave., you will find this hotel conveniently located at the 72nd St. entrance to Central Park. A splendid garage just around the corner.

COPELAND TOWNSEND
Managing Director

REFLEX SPARK PLUGS

Our patent Baffle drives soot, dirt, and all short-circuiting matter away from the interior and out through the spark gap at every explosion. Reflex plugs are made right, stay clean, and keep your car on the go.

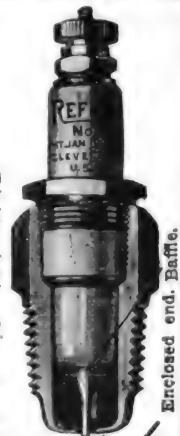
Fully guaranteed against defects; also, if for any reason at all you are not pleased with them after 30 days' trial, return them and get your money back.

Sixteen leading automobile and motorcycle manufacturers use Reflex plugs as regular equipment.

Send for Catalog of full line and our prices.

C. M. FOSTER, Sales Agent
51 Bowker St. Boston, Mass.

THE REFLEX IGNITION CO., Cleveland, O.



Mea
MAGNETOS



S. R. O.
BALL BEARINGS



Sole Importers

MARBURG BROS., 1790 Broadway, NEW YORK

(When Writing to Advertisers Please Mention The Automobile Journal.)

TRADE MARK
NON-FLUID OIL
REGISTERED IN
UNITED STATES PATENT OFFICE



Recognized as the **high-est grade** lubricant on the market. Consistently retains the patronage of the great majority of car owners who **know** that the **best** lubricant is the **cheapest**, because it protects their car investments **most surely**.

Automobile manufacturers recommend it. Try it out on your own car.

"K. No. 00 Special" grade for sliding gear transmission.

"K. No. 000" for differential, compression cups and all bearings.

Reduced prices for 1915. Ask your dealer.

Sold by leading dealers everywhere. Look for the orange-colored can bearing sprocket-wheel trade-mark shown above.

New York & New Jersey Lubricant Co.
165 Broadway, New York. 1430 Michigan Ave., Chicago, Ill.

HAVOLINE OIL
It Makes a Difference



Garageman Jones: "I've decided to try HAVOLINE OIL on account of the strong, clear ring of their advertising. What do you think of it?"

Garageman Smith: "Here is the one oil which backs up in the car, everything said about it in print. I really believe it will get you farther at the least expense and that it saves many repairs."

Garageman Jones: "Do you sell much of it?"

Garageman Smith: "Yes, it costs no more than other oils and is in great demand among my customers. There are various grades for various makes of cars, so that I am able to suit most every owner."

Be sure you sell the oil in the Blue and White Can with the inner seal. We offer the garagemen the best packaged goods proposition on the market. Write for our Representative or for full information. Be sure and write for the "Sales Order."

INDIAN REFINING COMPANY
17 Battery Pl., Dept. L. New York



Why Pay Excessive Hotel Rates?

THE NEW AMSTERDAM

Euclid Avenue at 22nd Street, CLEVELAND, OHIO

A five minutes walk from the active centres, yet overlooking the most beautiful residence section of Cleveland.

"The logical resting place for tired Tourists."

Large airy suites of from two to five rooms (also single rooms.)

GARAGE NEARBY

RATES:—\$1.50 per day, each person
Dining Room Modified a'la Carte

A. A. McCASLIN, Managing Director

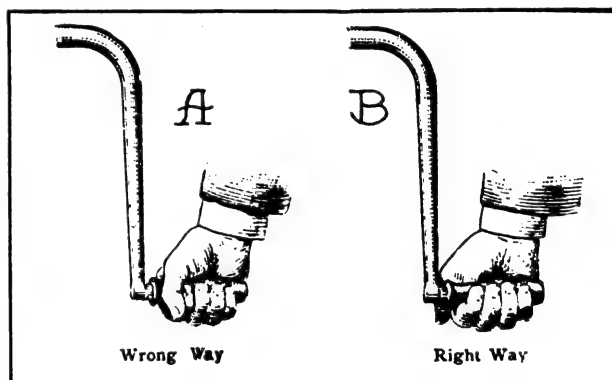
L. McNAMARA, Manager

(When Writing to Advertisers Please Mention The Automobile Journal.)

harsh gripping clutch is to be preferred to one that will not engage fully. If slipping is allowed to continue the frictional material of the male member will become glazed or charring will result and involve more or less costly repairs. Slipping may be the result of weakening of the contact spring and this can be remedied by increasing the tension if provision is made for adjustment. If no adjustment can be made the springs should be replaced by ones of sufficient tension. When the leather or other frictional material becomes worn the male member may engage too deeply and rub against the flywheel, in which event slipping will be inevitable. The only remedy for this trouble is to fit new frictional material to the cone, and although this requires some skill, it is not difficult or beyond the ability of the average individual.

GRASPING THE STARTING CRANK.

Accidents that have caused broken wrists and arms while starting cars are usually found to be



The Wrong and Right Way to Crank Cars.

resultant from deliberate neglect by those suffering injury in that they pushed the crank downward on the compression strokes of the engines with the spark well advanced. There is no reason why a motor should be started with the spark advanced, as the charge is fired in the cylinder before the piston has reached the top of its compression stroke, but the operator is doubly negligent if he attempts to start the motor by pushing down on the crank. The proper way to crank an engine is to pull up on the handle, as tests have proven that a person can lift with greater force than he can push. While many accidents have happened from this cause, numerous accidents have resulted from drawing up on the crank. A temporary short circuit in the timer, a broken advance rod, etc., have frequently caused backfiring and so precaution should be

taken at all times. Danger can be obviated if the handle is held correctly and the cranking done with the left hand instead of the right. If the handle is held as illustrated in Fig. A, one cannot easily release it, no matter whether the engine be cranked with left hand or right. Fig. B shows the way the handle should be held, and should it happen to be thrown back, the effect is to straighten the fingers and give the operator a chance to escape from the whirling crank.

HINT FOR TIRE CARE.

Many non-conductors of heat and lubricants are used to prevent friction between tire tubes and casing, of which the most common is French chalk. Too much of this chalk between the shoe and tube will be as bad, if not worse, than if there were no lubricant. When too much chalk is used it may be formed into small balls which, by constant friction, will so damage a tube in a very short time that it may be almost beyond repair or scarcely worth the cost of work necessary to restore it to usefulness.

INCREASING DIAMETER OF A PIN.

To have a pin a driving fit is often necessary, and when a pin is too large for the hole it is to be used in, a custom is to put it in a lathe or drill chuck and file it to the desired diameter. In such fitting too much stock may be filed off a pin, so that it may be an easy fit in the hole. If too much stock has not been filed from the pin, its diameter may be increased by prick punching the surface. This will raise small burrs and so increase the diameter as to make the pin a driving fit.

GRINDING MOTOR VALVES.

As a rule motor valves will not be gas tight after the car has been driven about 5000 miles. Careful observation will probably disclose that the compression is materially decreased and that the motor has lessened power, especially on the hills. When such a condition exists the carbon should be removed from the cylinders, the valve heads cleaned, the stems polished and the valves and parts carefully ground.

Clean Carbon From Cylinders

COMPLETE
GENERATING AND
DECARBONIZING
OUTFIT

\$15



Not too large for the small garage or shop, but large enough for any business a shop can do.

A complete equipment, fully guaranteed, and extremely economical to operate.

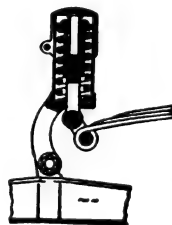
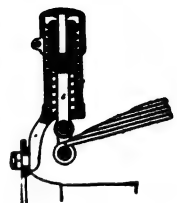
No tanks to handle, with material always ready, any person can use it and make money.

Will clean carbon from a cylinder in three minutes. Oxygen is generated in three minutes.

Saves time, labor and material, and does the best work science can conceive.

"O.G." Ford Shock Absorbers THE SET OF FOUR \$9

Can be attached in 15 minutes, are adjustable when attached, and are automatically adjusted by the load. Thoroughly lubricated by grease cups. No rattle or squeak. Sold with a guarantee for satisfaction during the use of the car, covering material, workmanship and complete absorption of shock. Purchase price refunded if not satisfactory. Method of attaching to rear spring of Ford car is shown by this illustration.



Extreme spring action with this absorber attached to the front spring is shown in this illustration of the manner of installation. The spring tension is adjusted by turning the cap, lessening or increasing the pressure.

No questions asked if refund is requested. The user is the one who must be satisfied.

Write today for Jobbers' and Dealers' Discount Sheets and Special Literature.

Oxygen Generator Co.
301 River Street TROY, N. Y.

(When Writing to Advertisers Please Mention The Automobile Journal.)



HAND KLAXON \$7.50



HAND KLAXONET \$4

WE MAKE the Hand Klaxon and the Hand Klaxonet. They are the result of seven years of signal making—the best hand signals made—but we believe a car owner is making

A mistake

to buy the Hand Klaxon or the Hand Klaxonet, or any hand signal *unless it is impossible to fit his car with a motor-driven signal!*

If his car has no batteries or electricity a hand signal is his best alternative. Nevertheless it IS an alternative—a makeshift.

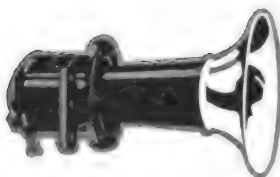
It is right under his nose. He gets the full force of its note. When his curtains are on, it is either outside and out of reach or inside and useless. It requires exertion to operate.

Contrary to general opinion, a hand signal does not *stand up* as does a motor-driven signal. The power delivered to a motor-driven signal is constant. No matter how hard or how lightly the electric button is pressed, the power at the instrument is always the same.

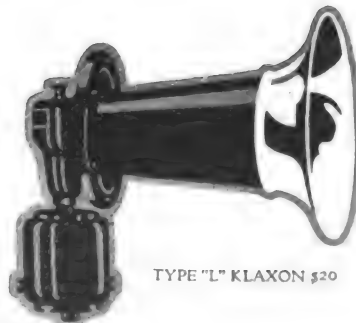
A hand signal on the other hand is absolutely at the mercy of the physical force of the operator. A powerful man, under excitement, will put an enormous amount of destructive force on the push-rod. No hand signal can be made that will withstand the abuse that all hand signals are subject to.

The great majority of hand signals sold last year were sold to dissatisfied users of electric vibrators who did not know the difference between electric signals of this type and those which operate on the *motor-driven* principle.

LOVELL-McCONNELL MFG. COMPANY · NEWARK · N · J.



KLAXONET \$15



TYPE "L" KLAXON \$20



KLAXET \$9

This advertisement planned, written and set up entirely in the Klaxon Factory. Type composition by the Klaxon Press with "Klaxon" type especially designed by Goudy.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

ZENITH



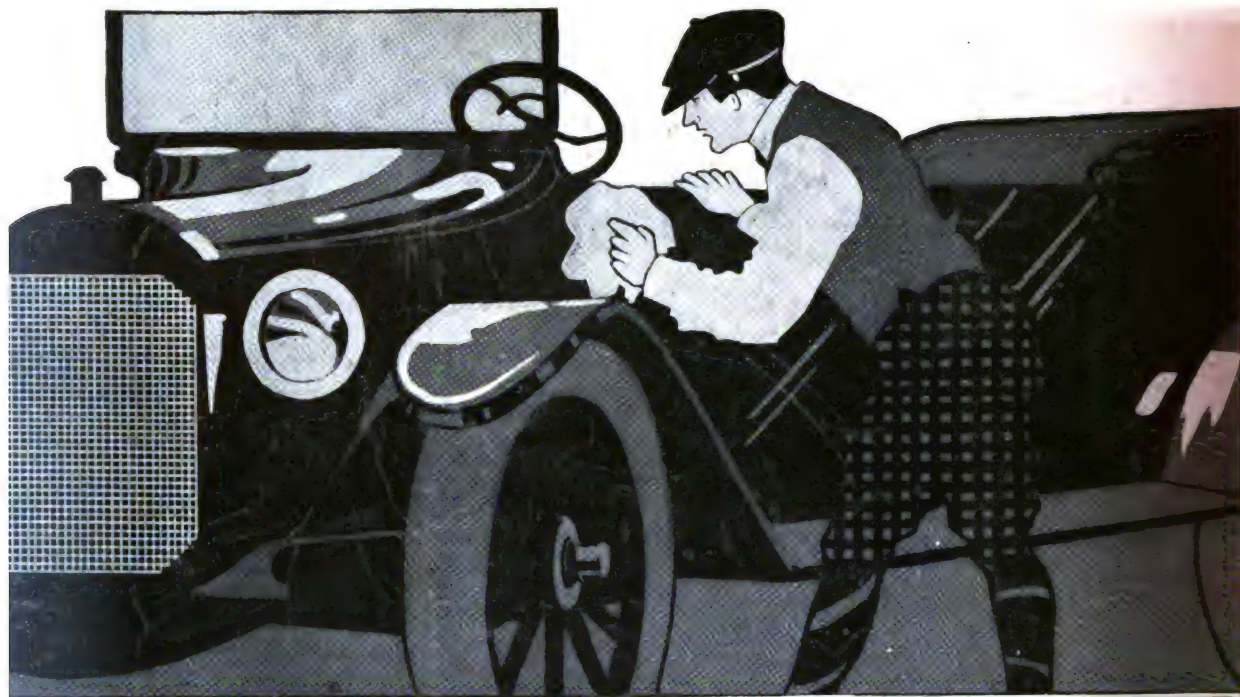
REF.

SIMPLICITY
SUPERIORITY

PRECISION
PERMANENCE

CARBURETOR

MADE IN DETROIT



Make Your Old Car Look Like New With **JOHNSON'S PREPARED WAX**

The Weatherproof Body Polish

It forms a thin protecting film over the varnish—it sheds dust and water—it greatly prolongs the life of the varnish—it prevents cracking and checking. It will make your old car look as well as a new coat of paint and varnish.

Does Not Gather Dust

Johnson's Prepared Wax imparts a beautiful hard, **dry** polish which will not collect dust. It preserves the varnish and protects it from the weather—it covers up small scratches—is clean and easy to use—and

"Sheds Water Like a Duck's Back"

Where the varnish has become rough, a perfectly smooth, new body can be built up with Johnson's Prepared Wax. Apply several coats, polishing each well and allowing a half-hour interval between coats. In many cases this will save the expense of having cars revarnished.

Hood and Fenders

can easily be kept shiny and new looking—an application of Johnson's Prepared Wax after every third or fourth washing will do the trick. Easy and inexpensive.

1 Pint 60c by Parcel Post—enough for a season's use.

Enclose 10c for a can of Johnson's Prepared Wax—sufficient for one application on a large car.

AJ4

Name _____

Address _____

City and State _____

Telephone Number _____

Send us the attached coupon together with 10c in coin or stamps and we will forward postpaid a can of Johnson's Prepared Wax—sufficient for one application on a large car.

Agents wanted to sell Johnson's Prepared Wax.

S. C. JOHNSON & SON

"The Wood Finishing Authorities"
RACINE, WIS.

VOL. XXXIX.

NO. 8.

AUTOMOBILE JOURNAL

\$1.50 the year
10 cents the copy

PAWTUCKET R.I.

May 25, 1915

6,760 MILES IN OFFICIAL MILEAGE TESTING BY THE AUTOMOBILE CLUB OF AMERICA

This officially tested and certified service-average gives a definite assurance of actual mileage—as against the empty claims of mere theoretical superiority.

And the fact that this remarkable figure had been established *before* the 50% increase in wearing quality effected in our 1915 product brings forth more clearly than ever the unequalled value in

VACUUM CUP TIRES

—especially at the prevailing price schedule, the lowest for any tires having a non-skid device *added to* regular thickness of tread.

The most satisfactory seller from the dealer's and consumer's viewpoint alike. Guaranteed oilproof. Guaranteed non-skid on wet or greasy pavements, else returnable at full purchase price after reasonable trial.

PENNSYLVANIA RUBBER CO., - - - JEANNETTE, PA.

Atlanta
Boston
Chicago

Cleveland
Dallas
Detroit

Kansas City, Mo.
Minneapolis
New York

Omaha
Philadelphia
Pittsburgh

St. Paul
San Francisco
Seattle

An Independent Company with an Independent Selling Policy.



A LESSON FROM THE SCHOOL OF EXPERIENCE

*Brake Lining of Supreme Quality is the only
kind that will stand up in this
kind of service*

The fact that almost every motor fire apparatus in this country leaves the factory where it is built equipped with

Raybestos
TRADE MARK
REG. U.S. PAT. OFF.

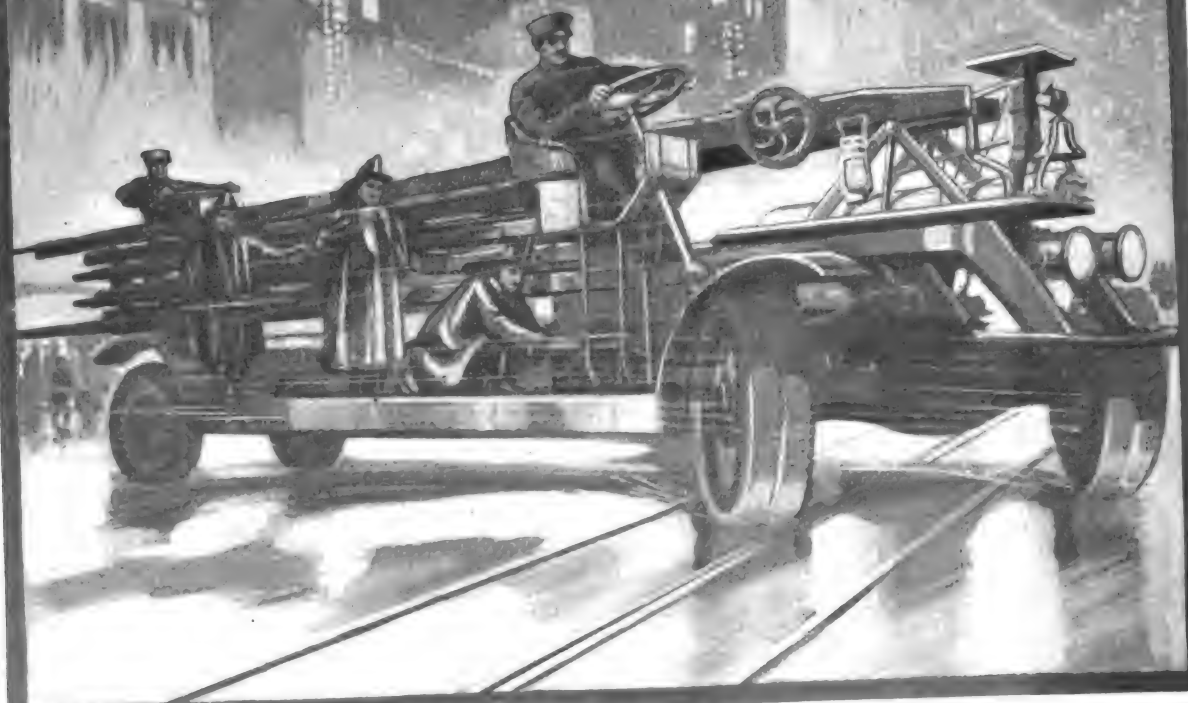
The fact that their brake lining replacements are made with RAYBESTOS almost without exception—means that RAYBESTOS possesses a quality and gives a service superior to any other. Let the proven efficiency of RAYBESTOS guide you in selecting the brake lining for your car this spring.

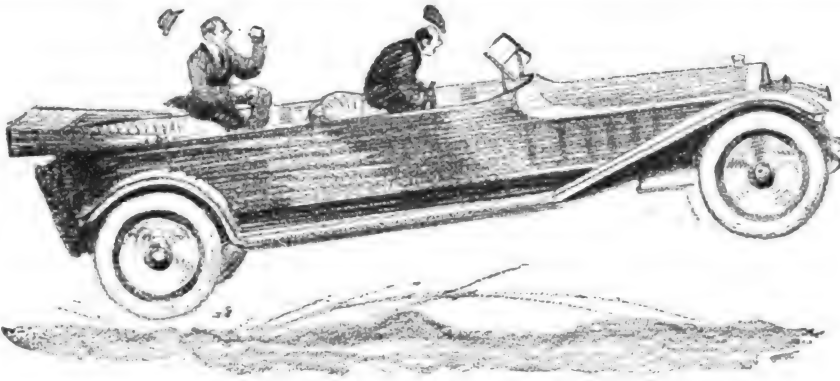
Sold by leading dealers everywhere.

The Royal Equipment Company

1378 Bastwick Avenue,

Bridgeport, Conn.





Impossible? Yes, but this is what springs *Try to do!*

There is nothing gentle about a spring. When a jolt compresses it, a spring's only impulse is to whip every one out of the car as quickly as possible. A spring saves you from actual bumps, but not from being thrown about and not from vibrations—and vibrations are harder on your body even than bumps.

★Hartford **SHOCK ABSORBER** *Soothes the Angry Spring*

Stretch a rubber band. Let it snap back. That's the way an uncontrolled spring works. Stretch it again and ease it back gently—that's the way a Hartford Shock Absorber *makes* a spring work.

The Hartford reduces spring-action to long undulating waves of motion—free from recoil, shock or vibration—even on the roughest roads.

It makes motoring really comfortable. It prevents accidents by keeping the wheels on the road. It adds years to the life of machinery and cuts down repairs and tire bills.

Let us send you a book which will tell you why the Hartford Shock Absorber is standard equipment on so many prominent cars and why 95% of the racing drivers use it. The book is free.

Hartford Suspension Co., E. V. HARTFORD,
President.

147 Morgan St., Jersey City, N. J.

BRANCHES:

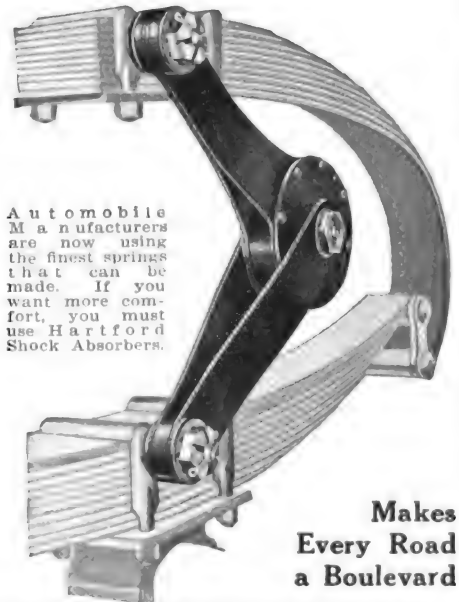
New York
Newark

Boston
Chicago

Philadelphia
Pittsburgh

Kansas City
Indianapolis

•Formerly Truffault-Hartford



Automobile
Manufacturers
are now using
the finest springs
that can be
made. If you
want more com-
fort, you must
use Hartford
Shock Absorbers.

**Makes
Every Road
a Boulevard**

(When Writing to Advertisers Please Mention The Automobile Journal.)

COE'S WRENCHES



UNEQUALLED FOR QUALITY THE WORLD OVER

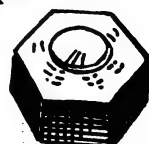
The wrench is the most used and the most useful tool in a motorist's kit.

COE'S Special Automobile Model is a perfect tool. The jaws are hardened special quality tool steel to withstand hard usage, and the handle is long to afford great leverage. The wrench is thin to work in space inaccessible for ordinary wrenches.

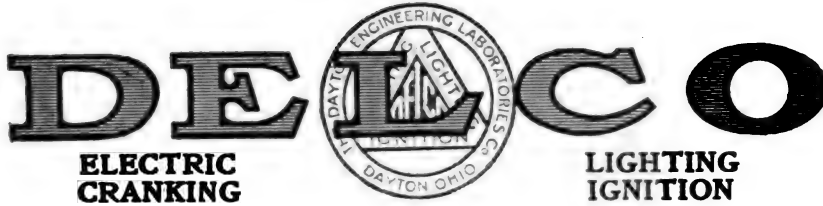
Coe's Special Automobile Model wrench is a tool kit in itself. Coe's quality costs slightly more, and it is worth many times the price of any other tool. A Coe's is always dependable, in the garage or on the road. Literature sent at request.

COE'S WRENCH COMPANY WORCESTER, MASS.

Distributors: { J. C. McCarty & Co., 21 Murray Street,
John H. Graham & Co., 113 Chambers Street, } New York City



(When Writing to Advertisers Please Mention The Automobile Journal.)

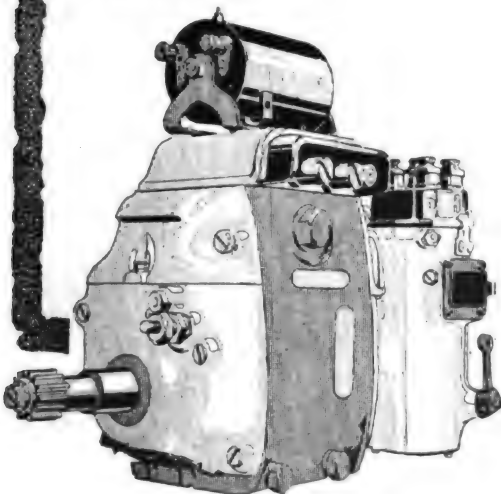


How often do you change your spark?

Do you change your spark every time you slow down to turn a corner?

Do you change your spark every time you step on the accelerator for a slight burst of speed?

Or do you just practically forget your spark excepting when your engine commences to knock?



Do you realize what spark regulation means in the development of power?

The average driver changes his spark when he has to do so to prevent knocking.

And yet, in order to secure maximum engine performance, the spark must be changed with every variation of engine speed.

Only the most expert drivers can do this accurately, by hand.

Delco automatic spark control, which is simply one feature of Delco ignition, does it automatically—and with absolute accuracy under all operating conditions.

The driver of a Delco equipped car forgets his spark lever and yet is always sure of a perfectly timed spark.

That is why Delco Equipped Cars are invariably economical in operation and unusually efficient in the development of power.

There are 240,000 cars now in operation equipped with Delco cranking, lighting and ignition.

**The Dayton Engineering
Laboratories Co.
Dayton, Ohio**

(When Writing to Advertisers Please Mention The Automobile Journal.)

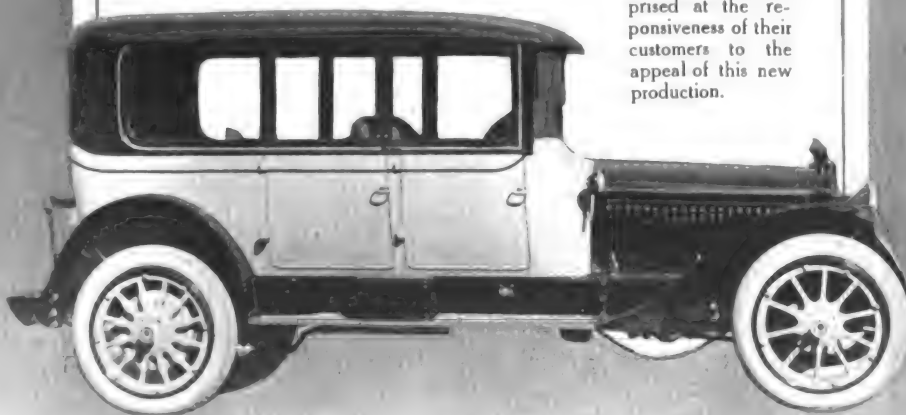
SPRINGFIELD CONVERTIBLE BODIES



THE limousine and the touring car are completely satisfactory only in certain seasons. The new Springfield Demi-Convertible body has no such limitations; it is the all-year, all purpose body.

More and more in America, as in Europe, the tendency is to demand protection from the sun, the dust and sudden showers even in touring. This body with its permanent top provides such protection, while it gives plenty of air and an unobstructed view. It may be converted into a limousine.

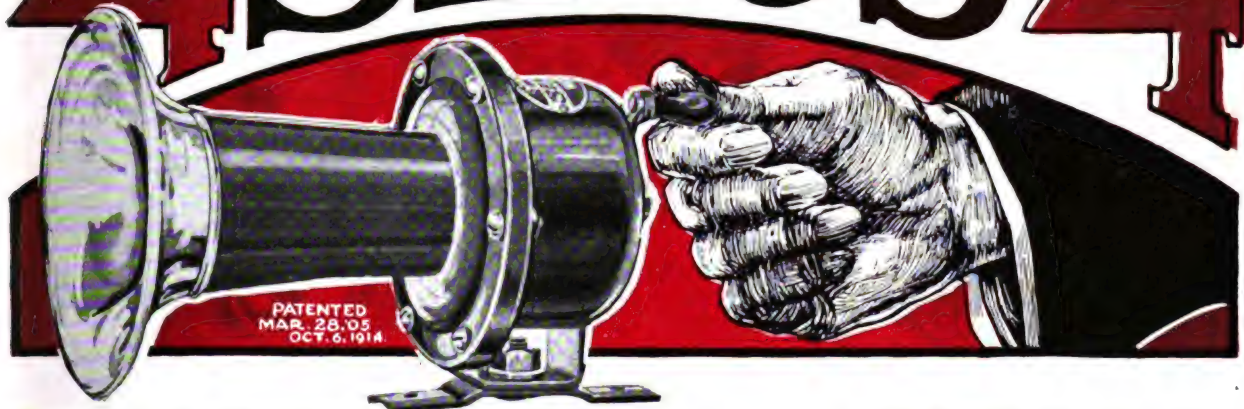
Dealers will be surprised at the responsiveness of their customers to the appeal of this new production.



SPRINGFIELD METAL BODY CO.

SPRINGFIELD, MASS.

\$4 SEISS \$4



DOUBLE ACTING Mechanical Horn

A powerful, commanding warning signal---the surprise in Mechanical Horns.

Operated by touch of hand---turning either to right or left---for short low or sharp blast---or for long continuous sound, same as a motor driven Horn, to demand attention and right of way.

A Horn that commands respect, both from the character and volume of signal given and from its finished appearance and design and high mechanical construction.

GUARANTEED FOR 10 YEARS

The SEISS Horn is made to wear and last for years through the hardest daily use.

No Springs or Ratchets. Only three bearings, automatically oiled and preserved from one cup. Nothing to get out of order. Impossible to wear out. Highest grade material throughout. Vanadium Steel Diaphragm. Mechanically and constructively perfect.

A Horn to be used---a Horn to be proud of. Finished in black enamel---Baked---with highly polished Nickel Bell---or Brass---or all Black.

At your dealers or direct from factory **\$4.00**
---with 10-year guarantee---only.....

THE SEISS MFG. CO., 445 Dorr Street, TOLEDO, OHIO

When Writing to Advertisers, Please Mention The Automobile Journal.

Index to Advertisers.

Page	Page
Ahlberg Bearing Co.....73	Texas Co., The.....11
Alsten & Goulding Co.....73	Thermoid Rubber Co.....79
Barrett Manufacturing Co.....72	Times Square Automobile Co.. 6
Bosch Magneto Co.....7	Tuller Hotel.....70
Boyd, F. Shirley.....69	Valvoline Oil Co.....73
Braender Rubber & Tire Co..72	Vanderpool Company, The.... 6
Coes Wrench Co.....2	Weed Chain Tire Grip Co....12
Continental Asbestos Corp....70	
Culver Stearns Mfg. Co.....70	
Dayton Eng. Lab. Co.....3	
Dixon Crucible Co., Jos.....74	
Dover Stamping & Mfg. Co....75	
Eagle Oil & Supply Co.....6	
Eisemann Magneto Co.....75	
Garford Mfg. Co.....69	
Goodyear Tire & Rubber Co..72	
Harris Oil Co., A. W.....74	
Hartford Suspension Co.....1	
Heinze Electric Co.....79	
Hotel Longacre.....69	
Hotel Majestic.....76	
Hotel New Amsterdam.....76	
Hotel Tuller.....70	
Inter-State Motor Co.....78	
Johnson, S. C. & Son.....65	
Longacre Hotel.....69	
Majestic Hotel.....76	
Marburg Bros.....78	
Mea Magneto Co.....78	
Mecca Mfg. & Spec. Co.....6	
Metz Company.....75	
Miller Rubber Co.....77	
Mossberg Co., Frank.....61	
Motor Parts Co.....70	
National Jitney, The.....72	
New Amsterdam Hotel.....76	
New Departure Mfg. Co.....72	
Nordyke & Marmon.....79	
N. Y. & N. J. Lubricant Co..78	
Peerless Motor Car Co.....70	
Penn. Rubber Co.....Cover	
Pierce-Arrow M. C. Co....Cover	
Pyrene Co. of N. E.....68	
Royal Equipment Co.....Cover	
Scripps-Booth Co., The.....76	
Seiss Mfg. Co.....75	
Splitdorf Electrical Co.....73	
Springfield Metal Body Co...4	
Standard Oil Co.....71	
Standard W. F. Co.....Cover	
Staybestos Mfg. Co., The...67	
Superior Mfg. Co.....69	

ATTENTION

Garages
Supply Dealers
Automobile Agents

If you wish to save money in the purchase of your Automobile Supplies ask for Bargain Bulletin No. 12, from the

Mecca Mfg. & Specialty Co.

1743 Broadway,
NEW YORK

1208 Michigan Ave.,
CHICAGO

FOR SALE.

Shop Vulcanizer, Bargain.
Vanderpool, Springfield, O.

We sell everything pertaining to the automobile at half regular prices. Send for our great "PRICE WRECKER" No. 5, containing 3000 auto bargains at cut prices. TIMES SQUARE AUTOMOBILE Co. World's largest dealers. S. W. Cor. 56th St. and Broadway, N. Y. 1210 Michigan Avenue, Chicago.

Accessory and Garage Journal

A Distinct Trade Publication

Guaranteed to Have an Exclusive
Trade Reader Distribution of

20,000 Copies
Each Monthly Issue

**Without a Competitor
in Its Field**

Detailed Advertising Information
at Request

Accessory and Garage Journal
Times Building, Pawtucket, R. I.

IMITATED
BUT NOT
DUPLICATED

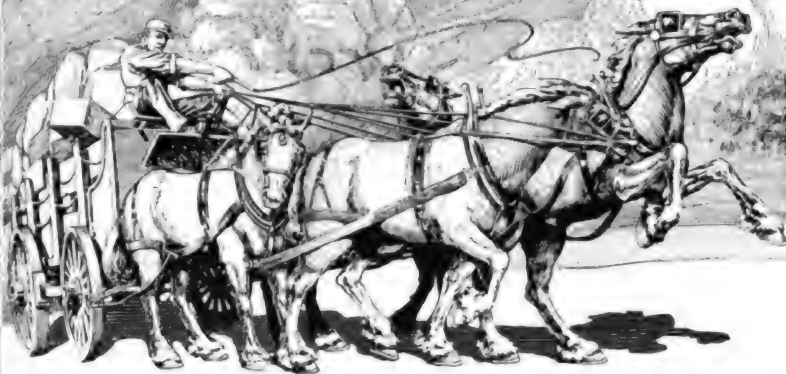
EAGLE
NO-KARBON
AUTO OIL

THE OIL THAT SUITS
AND DOES NOT SOOT.

Carbon in your cylinders means loss of power. Customers report 10,000 to 15,000 miles with no carbon troubles. A good motto: TRY ANYTHING ONCE. EAGLEINE NO-KARBON AUTO OIL is furnished in 1-5-10 gallon, 30 and 50 gallon Steel Drums with faucets for which no extra charge is made.

**EAGLE OIL
AND SUPPLY CO.**

104 BROAD STREET, BOSTON, MASS.



FORD Owners: Have YOU? This Kind of Power?

THIS is how your Ford acts with a poor ignition system. Each horse represents a cylinder of your engine, the wagon your car. Instead of pulling equally, as they should, one horse is jerking ahead, another to the side, one backing, and the other plunging in the air. The truck is getting nowhere. It is being wrenched and racked. It is a true example of EXPENSIVE INEFFICIENCY.

Poorly designed multi-unit coil ignition systems make your engine pull like these four balky horses; one cylinder pulls powerfully, another barely moves down on its proper stroke; each cylinder works against the others. There are vibration, uneven power and overheating. The engine and car soon become racked and ruined.

THE BOSCH MAGNETO The Modern Ignition System

cures all this, for it serves the Ford as well as it serves the scores of high grade cars on which it is standard. It gives power and snap to the engine because its arc-like sparks ignite ALL the gas in the cylinders and occur in exact relation to each other. It produces even running, the utmost efficiency and a smile of satisfaction. It's like the powerful team pulling together—IT'S A REAL NECESSITY.

You save yourself all ignition worry, you get a better car, you're satisfied when you fit your Ford with a Bosch Magneto. A simple attachment makes it easy.

Write for "The Key to Ford Efficiency" and get an inkling how to make your Ford a better car.

Bosch Magneto Company, 204 West 46 Street, New York
Chicago Detroit Toronto San Francisco

Bosch Attachments made also for all battery ignited cars

Buyers' Reference and Guide.

ACCESSORY MANUFACTURERS AND JOBBERS.

Alsten & Goulding Co., Worcester, Mass.
Auto Parts Co., Providence, R. I.
Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.
Times Square Auto Co., 56th St., at Broadway, New York City.

AIR COMPRESSORS AND TANKS.

Brunner Mfg. Co., Main Office and Factory, Utica, N. Y.; New York Office, Hudson Terminal Bldg., 30 Church St. (Brunner.)
Williams Foundry & Machine Co., Akron, O.

ANTI-RATTLERS.

King Specialty Mfg. Co., Brookline, Mass.

ARBOR PRESSES.

Bartlett, Edwin E., 322 A St., Boston. (Greenerd.)

AUTOMOBILE ACCESSORIES.

Gemco Mfg. Co., 743 So. Pierce St., Milwaukee, Wis.

AUTOMOBILE PARTS.

Gemco Mfg. Co., 743 So. Pierce St., Milwaukee, Wis.

AUTOMOBILES. (See Cars.)

AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

Motor Specialties Co., Waltham, Mass.

BALLS AND BALL BEARINGS.

Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1790 Broadway, New York City; 805 Woodward Ave., Detroit.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (R. I. V.)

Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)

New Departure Mfg. Co., Bristol, Conn. (New Departure.)

Norma Co. of America, 1790 Broadway, New York City. (Norma.)

BEARING METALS.

Bunting Bronze and Brass Co., 727 Spencer St., Toledo, O. (Bunting.)

BODIES—WOOD AND METAL.

Highland Body Mfg. Co., Cincinnati, O. (Highland.)

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

BRAKE BANDING OR LINING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Multibestos.)

Royal Equipment Co., 1378 Bostwick Ave., Bridgeport, Conn. (Raybestos.)

Standard Woven Fabric Co., Framingham, Mass. (Multibestos.)

Staybestos Mfg. Co., Lena and Armat Sts., Germantown, Philadelphia, Penn. (Staybestos.)

Thermold Rubber Co., Trenton, N. J.

BRUSHES, WIRE.

Williams Foundry & Machine Co., Akron, O.

CABLE, AUTOMOBILE.

Packard Electric Co., The, Warren, O.

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARBURETORS.

Air-Friction Carburetor Co., Dayton, O. (Model C.)

Zenith Carburetor Co., Detroit. (Zenith.)

CARS—GASOLINE PLEASURE.

Inter-State Motor Co., 804 West Willard St., Muncie, Ind. (Inter-State.)

Metz Co., Waltham, Mass. (Metz.)

Nordyke & Marmon Co., Indianapolis. (Marmon.)

Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Scripps-Booth Co., Detroit. (Scripps-Booth.)

Stutz Motor Car Co., Indianapolis. (Stutz.)

White Co., Cleveland, O. (White.)

Willis-Overland Co., Toledo, O. (Overland.)

Winton Motor Car Co., 131 Berea Road, Cleveland, O. (Winton.)

CARS—GASOLINE COMMERCIAL.

Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)

Chase Motor Truck Co., 106 West St., Syracuse, N. Y.

Duplex Power Car Co., Charlotte, Mich. (Duplex.)

Federal Motor Truck Co., Junction and Leavitt Sts., Detroit. (Federal.)

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

Independent Motors Co., Port Huron, Mich. (Independent.)

Jeffery Co., Thos. B., Kenosha, Wis.

Lanth-Juergens Motor Car Co., Fremont, O. (Fremont Mals.)

Packard Motor Car Co., Detroit, Mich.

Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Sanford Motor Truck Co., Syracuse, N. Y. (Sanford.)

Signal Motor Truck Co., Detroit. (Signal.)

Sullivan Motor Car Co., Rochester, N. Y. (Sullivan.)

White Co., Cleveland, O. (White.)

CARS—ELECTRIC COMMERCIAL.

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

CHAIN LUBRICANTS.

Motor Accessories Inc., 749 A Boylston St., Boston. (Chain-Lub.)

CHAINS, TIRE AND ANTI-SKIDDING DEVICES.

Weed Chain Tire Grip Co., 23 Moore St., New York. (Weed.)

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

CIGAR LIGHTERS. (See Lighters.)

COILS.

Heinze Electric Co., Lowell, Mass.

CONTROLLERS.

Pierce Speed Controller Co., Anderson, Ind.

CRANK HOLDERS.

King Specialty Co., Brookline, Mass. (King.)

CYLINDER CLEANING COMPOUND.

Bowling Green Sales Co., 42 Broadway, New York City.

Dyer Apparatus Co., Cambridge, Mass. (Oxy-Carbon.)

ELECTRIC LIGHTING EQUIPMENT.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FAN BELTS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

FIRE EXTINGUISHERS.

Pyrene Co. of N. E., 83 Broad St., Boston.

FORD AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

FORD HOODS AND RADIATORS.

Superior Lamp Mfg. Co., 136 W. 52nd St., New York, N. Y.

FORD STARTERS.

Hunter Auto Supply Co., Hunter Bldg., 333 W. Madison St., Chicago, Ill. (Hunter.)

Walden Mfg. Co., 73 Commercial St., Worcester, Mass.

FUNNELS, AUTO.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GEARLESS DIFFERENTIALS.

Gearless Differential Co., 864 Woodward Ave., Detroit, Mich.

GEAR SETS.

Detroit Radiator Spec. Co., 961 Woodward Ave., Detroit, Mich.

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind. (Ross.)

GENERATORS.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

HEADLIGHT DIMMERS.

Chaney Co., L. F., Springfield, O. (Chaney.)

HEATERS.

Superior Mfg. Co., N. S. Pittsburg, Penn. (Superior Safe Garage.)

HORNS.

Garford Mfg. Co., Elyria, O. (Tuto.)

Lovell-McConnell Mfg. Co., Newark, N. J. (Klaxon.)

Seiss Mfg. Co., 444 Dorr St., Toledo, O.

INSULATION.

Packard Electric Co., The, Warren, O.

JACKS.

Motor Specialties Co., Waltham, Mass. (Excel Auto.)

LAMPS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric Trouble.)

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Clamp.)

LEATHER GOODS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

LIGHTERS, CIGAR.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)

BUYERS' REFERENCE and GUIDE—Continued.**LIGHTING SYSTEMS, ELECTRIC.**

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Garford Mfg. Co., Elyria, O. (Dynalux.)

Malton Specialty Co., 775 Boylston St., Boston, Mass.

Motor Parts Co., 818 No. Broad St., Philadelphia, Penn.

LUBRICANTS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)

Continental Asbestos Corp., Worcester, Mass. (Spedolene.)

Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)

Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagleine No-Karbon.)

Harris Oil Co., A. W., 326 So. Water St., Providence, R. I.; 143 No. Wabash Ave., Chicago. (Harris.)

New York Lubricating Oil Co., 116 Broad St., New York City. (Monogram.)

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MotoRol, Non-Fluid, Kejex.)

Standard Oil Co., New York. (Polarine.)

Texas Company, 17 Battery place, New York City. (Texaco.)

Vacuum Oil Co., Rochester, N. Y. (Gar-goyle Mobiloil.)

Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETO COVERS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.

Elsemann Magneto Co., 32 33d St., Brooklyn, N. Y. (Elsemann.)

Heinze Electric Co., Lowell, Mass. (Heco.)

Marburg Bros., 1790 Broadway, New York. (Mea.)

Motor Parts Co., 818 No. Broad St., Philadelphia, Penn.

Splitdorf Electrical Co., 98 Warren St., Newark, N. J.

MAILING LIST.

Trade Circular Addressing Co., 166 W. Adams St., Chicago.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

MOTORS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Michigan.)

Wisconsin Motor Mfg. Co., Milwaukee, Wis.

PATCHES, TIRE.

Braender Rubber & Tire Co., Rutherford, N. J. (Cementless.)

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

PRESSES. (See Arbor Presses.)**PUMPS, TIRE.**

Kellogg Mfg. Co., Rochester, N. Y. (Kellogg.)

PUMPS, VALVE.

Hill Pump Valve Co., Chicago, Ill.

RADIATOR CEMENT. (See Cements.)

RADIATOR & HOOD COMBINATIONS.

Superior Lamp Mfg. Co., 136 W. 52nd St., New York, N. Y.

REAMERS.

Harding Distributing Co., Boston. (Martell Aligning.)

RINGS. (See Piston Rings.)**ROAD BUILDING MATERIALS.**

Barrett Manufacturing Co., New York. (Tarvia.)

ROLLER BEARINGS.

Hyatt Roller Bearing Co., Detroit. (Hyatt.)

Norma Co. of America, 1790 Broadway, New York City. (Norma.)

SEATS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Racing.)

SEAT COVERS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SELF-STARTERS. (See Motor Starters.)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Sager Peerless.)

Hartford Suspension Co., 147 Morgan St., Jersey City, N. J.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SPARK PLUG CASES.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SPARK PLUGS AND IGNITERS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)

Bosch Magneto Co., 223-225 W. 46th St., New York.

Heinze Electric Co., Lowell, Mass. (Heco Priming.)

Milwaukee Auto Specialty Co., 705-711 Chestnut St., Milwaukee, Wis. (Centerfire.)

Splitdorf Electrical Co., 98 Warren St., Newark, N. J.

Stonebridge Sales Co., 10 Wall St., New York, N. Y.

SPRINGS FOR AUTOMOBILE SUSPENSION.

Marburg Bros., Inc., 1790 Broadway, New York. (Marburg-Hagen.)

Tuthill Spring Co., 756 Polk St., Chicago. (Titanic Unbreakable.)

SPROCKETS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

STARTERS.

Motor Parts Co., 818 No. Broad St., Philadelphia, Penn.

TEST CLIPS.

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Universal.)

THERMOS CASES.

Dover Stamping & Manufacturing Co., Cambridge, Mass.

TIMERS.

Motor Specialties Co., Waltham, Mass. (Bemus.)

TIME STAMPS.

Hoggson & Co., S. H., Thames Bldg., New York, N. Y.

TIRE ACCESSORIES.

Braender Rubber & Tire Co., Rutherford, N. J.

TIRE CHAIN GRIPS. (See Chains.)

TIRE PRESERVATIVES AND PROTECTORS.

Braender Rubber & Tire Co., Rutherford, N. J.

TIRE REPAIR EQUIPMENT.

Stevens & Co., 373 Broadway, New York City. (Sampson Inner Tube Plug and Outfits.)

TIRES, CASINGS AND INNER TUBES.

Braender Rubber & Tire Co., Rutherford, N. J. (Braender.)

Federal Rubber Mfg. Co., Milwaukee, Wis. (Federal.)

Goodyear Tire & Rubber Co., Madison St., Akron, O.

Miller Rubber Co., Akron, O. (Miller.)

Polack Tyre & Rubber Co., 246 W. 59th St., New York City. (Polack.)

TOPS AND ATTACHMENTS.

Highland Body Manufacturing Co., Station P, Cincinnati, O. (Highland Coupe.)

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

TRANSFORMERS.

Packard Electric Co., The, Warren, O. TRUCKS AND TRACTORS. (See Cars, Commercial.)

UNLOADERS.

Gallon Iron Works and Mfg. Co., 116 East Main St., Gallon, O. (Gallon Eclipse Portable.)

VALVE LIFTERS AND RESEATERS.

Pero, H. G., Suite 718-719 Michigan Blvd., Bldg. 30 No. Michigan Blvd., Chicago.

VALVE TOOLS.

American Valve Tool Co., 589 Hudson St., New York, N. Y.

VULCANIZERS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)

Vanderpool Co., Springfield, O.

Williams Foundry & Machine Co., Akron, O.

WARNING SIGNALS.

Sells Mfg. Co., 444 Dorr St., Toledo, O.

WELDING OUTFITS.

Dyer Apparatus Co., Cambridge, Mass. (Dyer.)

Waterhouse Welding Co., 3 Pelham St., Boston, Mass.

WHEELS, WIRE.

Houk Mfg. Co., 1709 Elmwood Ave., Buffalo, N. Y. (Houk Detachable.)

WRENCHES AND COMBINATION OUTFITS.

Coe's Wrench Co., Worcester, Mass.

Lane, Will B., 180 No. Dearborn St., Chicago. (Unique Ratchet.)

Mossberg Co., Frank, Attleboro, Mass.

Walden Mfg. Co., 73 Commercial St., Worcester, Mass.

NEW YORK

CHICAGO

BOSTON

DETROIT.

Subscriptions:

The United States and Mexico,
\$1.50 a year; Canada and For-
eign Countries in Postal
Union, \$2.00 a year.
Ten cents a copy.

THE AUTOMOBILE JOURNAL

Remittances:

Should be made by Check, Draft,
Postoffice or Express Money
Order, or Registered Letter.
Money enclosures must
be at sender's risk.

William H. Black, Treasurer.

AUTOMOBILE JOURNAL PUB. CO.

Published the 10th and
25th of Each Month.

D. O. Black, Jr., Secretary.

Times Building, Pawtucket, R. I.

Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under Act of Congress of March 3, 1879.

VOL. XXXIX.

MAY 25, 1915.

NO. 8.

PUBLISHER'S AND READERS' PAGE.

Twelve-Cylinder Power Plants have been announced for next season. In the coming issue of the Automobile Journal will be found special articles in which these motors are described and analyzed by specialists in the field of motor vehicle power plants. Bearing the stamp of authority, they will impart some very exceptional information regarding this latest development in pleasure cars. Two models have been announced at this time, the Packard and National cars, and complete descriptions of the various components of these pioneers of the 1916 season will be given in exhaustive detail so that the prospective purchasers of new cars for next year will have a thorough knowledge in advance of the general buying season.

The June 10 Issue of this publication will contain all the authentic news of the International Sweepstakes race at Indianapolis. The current issue, as will be noted, presents all the latest and best information possible to obtain in advance of the event, with several important illustrations. The coming issue will maintain the pace set, giving all the authentic results of the race, the special mechanical features of the contesting cars, lap time averages, comparative statements as they relate to former races, records, men, etc., the human interest details of the contest and a great number of interesting photographs in which the reader can visualize the different phases of the race. Careful reading of the story will enable the reader to become familiar with the foreign and racing "masters," and with the constructional details which make it possible to drive automobiles at such tremendous speeds.

The May Number of the Accessory and Garage Journal, now nearly ready for distribution, is one of the most important issues ever published. Its special feature lies in the fact that it is the first time that any paper has presented to the reading public in one edition, without extra charge, all the specification

data relating to all pleasure and commercial vehicles. Heretofore, such information, because of its value and the space it requires, has been published in book or booklet form and sold frequently at \$1 the copy, or even more. It can now be obtained complete in a single issue of the Accessory and Garage Journal, which, while it is a special number, is sold at the regular price of 20 cents a copy. These data include the

names and addresses of the manufacturers, classified and alphabetically arranged, the types and number of different models each manufacturer makes, prices, wheelbases, tires, motor specifications, transmission systems, springs, controls and other details which make a concise but complete description of every motor vehicle now being manufactured. This information makes a reference library which every car owner will find greatly advantageous to possess.

The Ford Department editor promises that the high standard established for that division of the Automobile Journal will not only be maintained, but will be materially advanced in succeeding issues, both in the educational text relating to the operation, maintenance and repair, and the editorial analyses of the new accessories and equipments for Ford cars. New manufacturers of parts and equipments are entering the field daily, and the established makers are constantly developing and marketing new features. The majority of these are necessary to the proper care and repair of the car, as well as toward making for the acme of comfort and luxury. A careful study of this department each issue will keep the Ford owner exceedingly well informed as to

the latest and best developments in the accessory field. An unusual departure of the section is that in addition to authoritative and impartial analyses of the devices, there is also given the prices and addresses of the makers, so that the reader has all the necessary information at once, without obliging him to inquire of the makers or distributors as to these essential points.

Partial Table of Contents.

	Page
*The Fifth Indianapolis Sweepstakes.....	13
*Foreign Army Motors and Drivers.....	25
*New Abbott-Detroit "Eight".....	28
General News of the Industry.....	31
*Car Accessories and Equipment.....	35
*Gas-Electric Busses for Urban Use.....	40
*Practical Motor Car Repairs.....	42
*Modern Street Washing Methods.....	46
*Jitney News from Everywhere.....	49
Industrial Happenings and Comment.....	51
*Chase Trucks Include European Ideas.....	52
A. A. A. to Fight Double Taxation.....	54
*Roads That Keep Pace with Traffic.....	55
*Oakland Lowers Price for 1916 "Four".....	56
*Suggestions for Ford Car Owners.....	59
*Ford Car Accessories and Equipment.....	62
*New Car Owners' Department.....	65
*Readers' Queries.....	66

*Indicates article is illustrated.

TEXACO MOTOR OIL

Meets the Demands of Every Motor

NO matter whether it be a ponderous 3-ton truck, a light pleasure car or a speedy motorcycle, Texaco Motor Oil will get the maximum power out of its motor.

Texaco Motor Oil retains its viscosity under heat. *It can not char.* By its use you eliminate hard carbon deposits on the piston and cylinder heads and the gumming of piston rings, valve and valve seats.

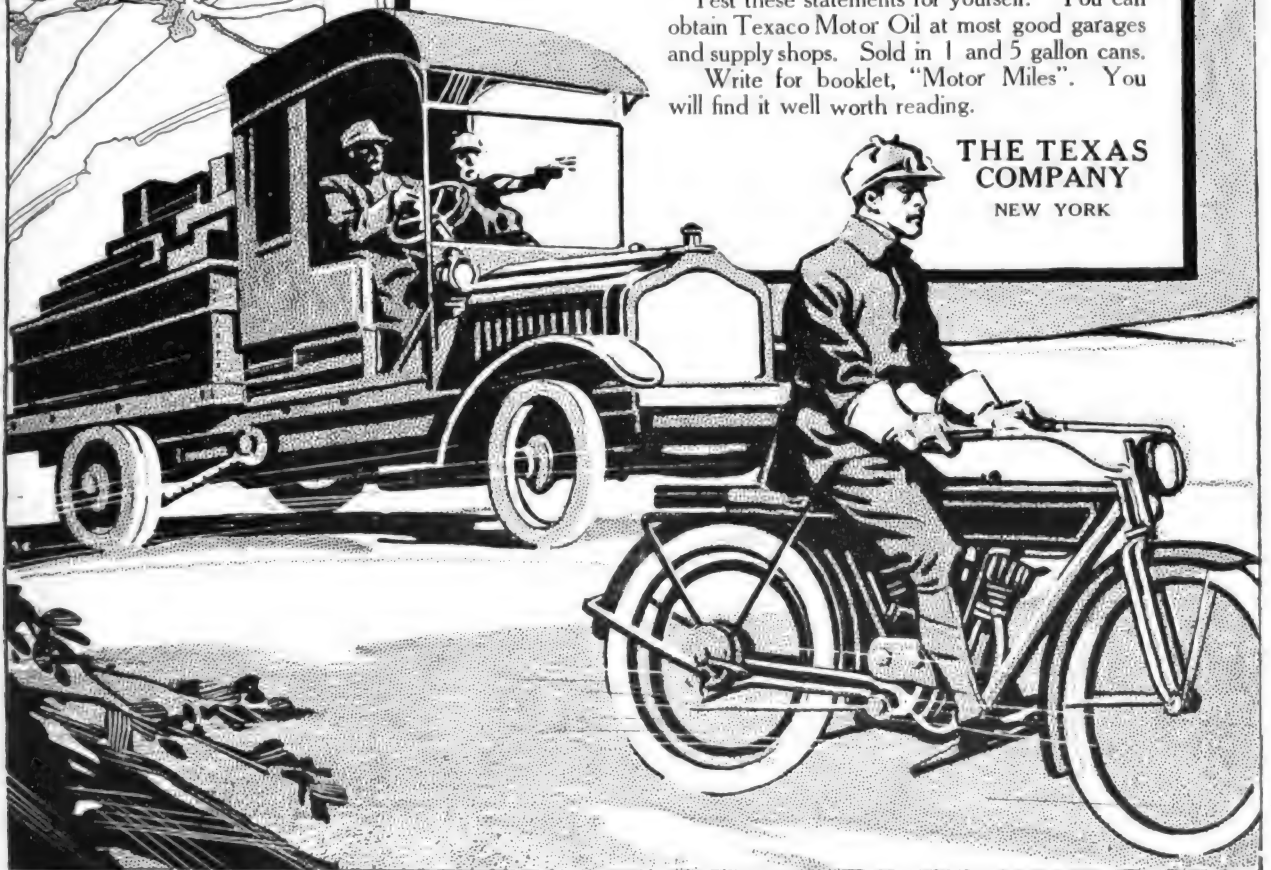
It means greater mileage, smaller gasoline bills and a quiet, easy-running motor.

Texaco Motor Oil lubricates perfectly under all conditions. It does its work just as well during the long, hard drive at "90 in the shade" as in the run through the snow at zero.

Test these statements for yourself. You can obtain Texaco Motor Oil at most good garages and supply shops. Sold in 1 and 5 gallon cans.

Write for booklet, "Motor Miles". You will find it well worth reading.

**THE TEXAS
COMPANY**
NEW YORK



(When Writing to Advertisers Please Mention The Automobile Journal.)



Living it over Again

In a mental picture, he reviews the accident—the result of his recklessness

He realizes too late that it is *always foolhardy* to motor on slippery roads and streets without equipping all four tires with

Weed Anti-Skid Chains

The Only Real Safeguard Against Skidding

Strange, is it not, that some men laugh at peril—they do not seek to avoid danger—and they have no fear because they have no prudence.

They continue to motor over sleety, icy, or wet roads and pavements with "Foolish Dependence Upon Bare Rubber Alone" until a false turn—a sudden meeting at a corner—a slip or a skid—brings disaster as the punishment for their imprudence.

You motorists with reasoning brains put on your Tire Chains at the first indication of slippery streets, and the editors of the daily

newspapers are urging all motorists to follow your example.

For instance, the Public Ledger of Philadelphia, Pa., published by the owners of The Saturday Evening Post, in an editorial on August 1st, 1914, said that the simple adjuration to "Use Tire Chains on wet and slippery pavements" deserved to find its way into a law, and that law should by all means be enforced.

Promote "Safety First" in YOUR motoring circle—insist that everyone use Weed Chains on ALL tires.

Weed Chain Tire Grip Co., Bridgeport, Conn.

Also Manufacturers of Tire Chains and Lyon Grips especially constructed for Single and Dual Solid Truck Tires—Motorcycle Tire Chains, etc.

Manufactured for Canada by
DOMINION CHAIN COMPANY, Limited—Head Office: Shaughnessy Bldg., Montreal, Can.



When Writing to Advertisers, Please Mention The Automobile Journal.



THE FIFTH INDIANAPOLIS SWEEPSTAKES.

Twenty-Five-Contestants Left by Elimination Trials---Smallest Motors in History of Great Classic Will Be Used by Leading American and Foreign Drivers.

WHEN the cars start on their long journeys in the Fifth Annual International Sweepstakes on Saturday, May 29, the smallest field of contestants that has ever competed at Indianapolis will leap away from the starters' stand. The elimination trials have been particularly disastrous to the hopes of many drivers this year. Only 25 cars of the 41 entered survived, and of these, two have since been wrecked and may not be in shape to compete.

An exceptionally large number of new and revolutionary designs had been prepared for the contest, and several of these were found to be impossible to perfect in time even to appear for the trials. That happened to three Mercers, three F. R. P's., three Bergdolls, a Du Chesneau and Ralph Mulford's special car.

These cars represented radical attempts to

make up by high engine speed the difference in cylinder size required by this year's regulations, which have reduced the piston displacement of the cars by 150 cubic inches. The Mercers had 16 valves and were designed to turn over 3500 revolutions per minute, and the F. R. P's. were of a striking Knight engine design, which was said to be capable of 5000 revolutions per minute.

Their absence from the race will not, however, reduce its interest. In Dario Resta, an Italian, bred in England, and driving a French Peugeot, Europe has a representative of the first rank. The best America could pit against him in the Grand Prize and the Vanderbilt Cup events early in the spring could not keep up with him. J. Porporato, an Italian driver of an English Sunbeam, is another European star. It will be his first American appearance.

Most of the great American stars are in the race. Cooper, Wilcox and Anderson, the great Stutz combination, all qualified with flying col-



Front View of One of the Maxwell Cars.

ors. Ralph de Palma, in his Mercedes, made more than 98 miles per hour in the trials. Burman, who won the Oklahoma races, is there with his tried and trusted Peugeot. The three Maxwell drivers, Carlson, Rickenbacher and Tom Orr have qualified. Oldfield, whose Bugatti has been working badly, will drive a Sunbeam.

The small size of the cars adds interest to the race. In this the speedway officials have followed the general tendency of automobile design, which has produced constantly smaller and lighter cars.

No New European Designs.

During the year European engineers have been exclusively devoting themselves to the production of special vehicles for war uses and have not been able to develop anything new in racing cars. The European designs are the same as those of a year ago.

This year American engineers, for the first time, have very seriously devoted themselves to the designing of racing machines. They started with the long experience of Europe before them. No expense has been spared.

In many of the American cars very expensive special alloys, which yield as much strength as iron and steel with lighter weight, have been employed. They have been used in pistons, crankshafts, con-

necting rods and even in frames. Not only are many of these metals expensive in themselves, but they present difficulties in machining and finishing that are not encountered with more ordinary materials.

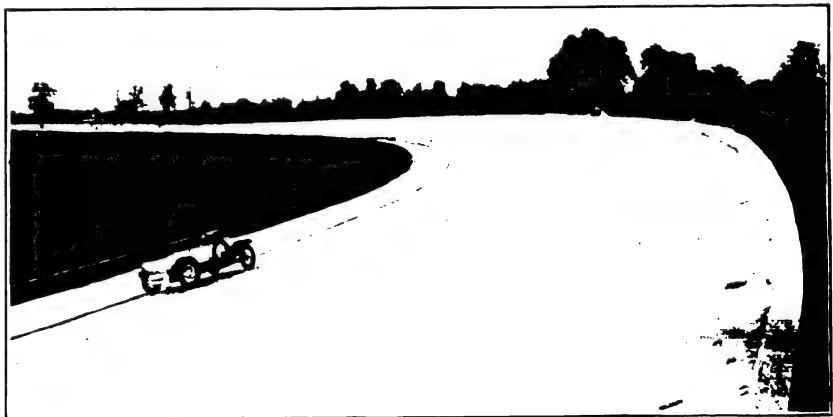
But light weight has become a matter of utmost importance in designing a car for the big race. Not only do the smaller engines in use make lighter weight an essential, but when the cars are going at rates of speed around 100 miles an hour, it is necessary that they should frequently slow down at the turns. When the turn is passed they must speed up again, and acceleration depends directly upon the weight of the car. While a heavy car might be equally successful in a straight away race, where no slowing up is necessary, smaller weight is essential on a curving track.

One of the many reasons why modern cars, with half the piston displacement of those made four years ago, can make better speed, is that the greater piston speed of the engines enables them to burn nearly twice as much gas as was burned in the large, slow-moving motors. The power developed depends, other things being equal, on the amount of gas from which it is abstracted.

In 1911, when the first 500-mile race was run, and again in 1912, big-engined and heavy cars with piston displacements of 600 cubic inches were used. In 1913 and 1914 this was reduced to 450 inches, and this year it is 300 inches—engines just half the size of those used in 1911 and 1912.

The First Year's Race.

The first year the 500-mile race was run the prizes offered by the Speedway company amounted to only \$25,000. But that was sufficient to draw out a big field of very prominent



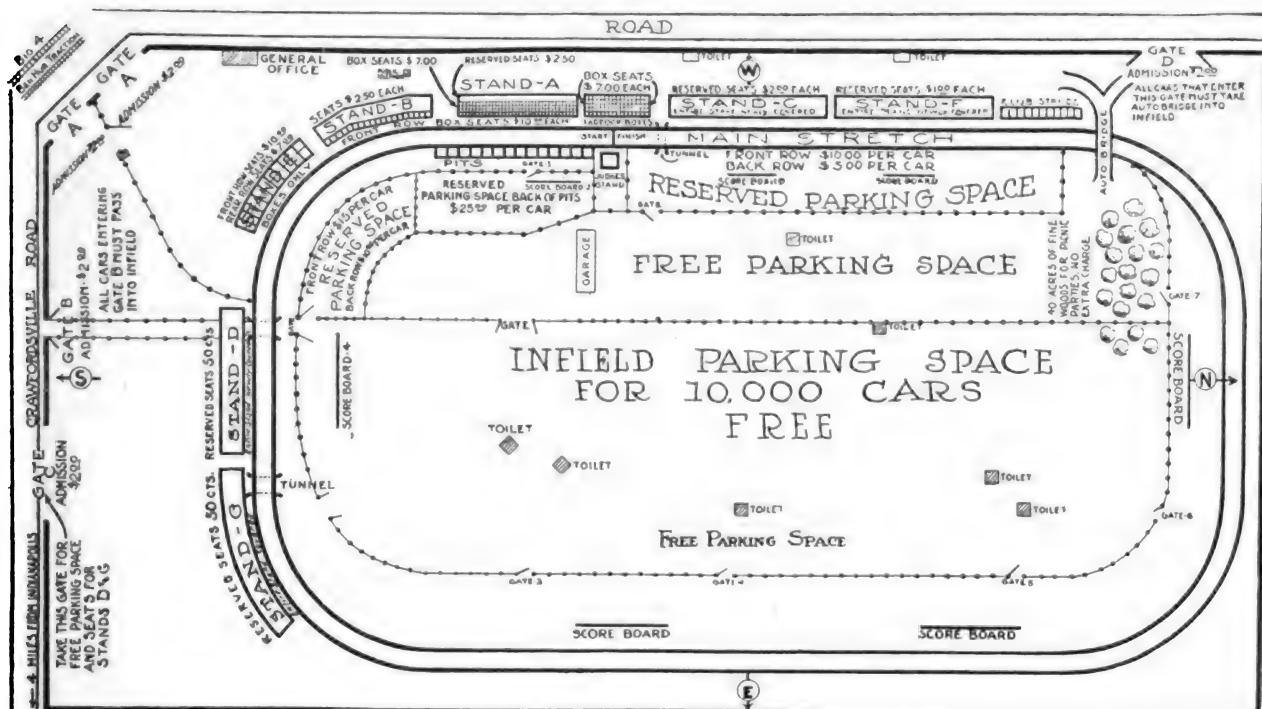
A View of the Speedway, Showing the New Retaining Wall.

entries. The international character of the event was not strong, however. For, while there were cars of three nations entered, two Benz and one Mercedes from Germany, two Fiats from Italy and 38 American cars, all of the drivers were American.

Ray Harroun won the first race, in his Marmon, in 6:42:08, averaging 74.65 miles per hour. D. Bruce-Brown, who was second, in a Lozier, averaged 74.29 miles per hour. Ralph Mulford, in a Fiat, covered the run at an average of 72.73 miles, and Spencer Wishart, in a Mercedes, at 72.65 miles. Twelve cars finished the race, and 13 more were still running when time was called.

world's record for the distance and for most of the intermediate distances. Including the value of special trophies he won, Dawson's share of the money amounted to \$35,000. He was followed over the line by Teddy Tetzlaff, in a Fiat, with an average speed of 76.60. Hugh Hughes was third, in a Mercer, averaging 76.30, and Merz, in a Stutz, finished fourth, with an average speed of 76 miles per hour.

In 1913, 35 cars were entered, and 27 of them started. This time the international character of the event was much more marked, though American cars greatly predominated. There were five nations represented: Germany, by a



Plan View of the Speedway, Showing the Parking Places.

Harroun's prizes amounted in all to \$14,250. This is the smallest amount that any winner has ever taken in the big event.

In 1912, only 27 cars were entered. Nine finished and only one other was running when the race was called. Although 12 prizes had been offered by the Speedway management that year, it was possible to award only 10 of them on the showing of the cars. Germany was represented by a Mercedes, and Italy by a Fiat, but again the international character of the event was negligible. The prize money offered totalled \$50,000.

Joseph Dawson won the race, driving a National 500 miles in 6:21:06, and averaging 78.73 miles per hour, which established at that time a

Mercedes; Italy, by three Isottas; England, a Sunbeam, and France with two Peugeots. The remainder were American cars. France finished in first place, America, in second and third; England, fourth; Germany, fifth; America, sixth; Germany, seventh, and American cars took the remainder of the prizes.

Goux Takes the Big Prizes.

Jules Goux, the French Peugeot entrant, who took the 1913 race, finished the course in 6:35:05. This average time was 75.92 miles per hour. This was considerably less than the time of the year before, due no doubt to the reduction in engine size from 600 cubic inches piston displacement to 450 inches. His share of the prize money was



about \$35,000, substantially the same as Dawson's in the year before.

Goux was followed across the tape by Spencer Wishart, in a Mercer, whose speed was 73.49 miles; Charles Mertz, Stutz, speed 73.38, and Albert Guyot, Sunbeam, 70.92 miles per hour.

In 1914 there were 48 cars entered. That number was reduced to 31 by the elimination trials. This time six countries were represented: America, with the majority of the cars, France, by three Peugeots and two Delages; Germany, by two Mercedes and one Bugatti; Italy, by an Isotta, and England, by a Sunbeam.

Rene Thomas, in a Delage, won the race in 6:03:45.99, and at an average speed of 82.47 miles per hour. This established a new world's

record for 500 miles and for all distances greater than 300 miles. The prize granted by the Speedway amounted to \$21,750, and a sufficient number of trophies were taken by the winner to make it \$35,000 in all.

The European cars had it very much their own way. Thomas was followed by Duray, in a Peugeot, at a speed of 80.99 miles per hour; Guyot, in a Delage, speed 80.20 miles per hour, and Goux, in a Peugeot, speed 79.49 miles per hour. The first American to finish was Oldfield, in a Stutz, who came fifth with an average speed of 78.15 miles per hour, a rate almost equal to the speed of the winner the year before.

As will be seen by a glance at the accompanying table, every car in the race this year, except the Sunbeam six, is a four-cylinder. From the standpoint of design it is noticeable also that the overwhelming majority of the cars, both European and American, are equipped with wire wheels. Overhead valves also are the rule.

The three Maxwells, designed by Ray Harroun, winner of the 1911 500-mile race, and now chief engineer of the Maxwell Motor Company, are four-cylinder cars, with a bore of $3\frac{3}{4}$ inches and stroke of $6\frac{3}{4}$ inches and a piston displacement of 298 inches. The cars each weigh complete, 2200 pounds. They are equipped with Master carburetors; use Bosch double ignition, Rajah plugs, and are lubricated with castor oil. Houck wire wheels carry 32 by $4\frac{1}{2}$ -inch tires. They have left side drive and centre control.

FOUR PREVIOUS RESULTS

The first Indianapolis 500-mile race was held in 1911 for cars of 600 cubic inches piston displacement. The purse was \$25,000. In 1912 the same size limit was in effect, but the purse was raised to \$50,000. In 1913 and 1914 the limit was cut to 450 cubic inches, but the prize money remained unchanged. The limit this year is 300 cubic inches. Winners of previous 500-mile races, together with their time and average are as follows:

Car	Driver	Time	Avg.
1911			
Marmon	Ray Harroun	6:42:08	74.50
Lozier	D. Bruce-Brown	6:43:51	74.20
Flat	Ralph Mulford	6:52:29	72.73
Mercedes	Spencer Wishart	6:52:57	72.65
Marmon	Joe Dawson	6:54:34	72.34
1912			
National	Joe Dawson	6:21:06	78.70
Flat	Teddy Tetzlaff	6:31:28	76.00
Mercer	Hughie Hughes	6:33:09	76.30
Stutz	Charlie Mers	6:34:40	76.00
Schacht	Bill Endicott	6:43:28	73.30
1913			
Peugeot	Jules Goux	6:35:05	75.92
Mercer	Spencer Wishart	6:52:57	72.65
Stutz	Charles Mers	6:48:49	73.38
Sunbeam	Albert Guyot	7:02:58	70.92
Mercedes	Theodore Pilyette	7:20:13	68.14
1914			
Delage	Rene Thomas	6:03:45	82.47
Peugeot	Arthur Duray	6:10:24	80.99
Delage	Albert Guyot	6:14:01	80.20
Peugeot	Jules Goux	6:17:24	79.41
Stutz	Barney Oldfield	6:23:51	78.15



The three Peugeots are similar to those that competed in last year's race. Resta's car is the one driven by George Boillot in the last Grand Prix of France. The cylinder dimensions are 92 mm. by 169 mm., and the piston displacement is 274 inches. In France it is known as a 4½ litre car. The other two Peugeots are what are known as three litre cars. The cylinder dimensions are 78 mm. by 156 mm., making a piston displacement of 183 cubic inches. These are similar cars to that driven by Duray in the Indianapolis race last year.

On the front of the motor is a short cross shaft driving a combined oil and air pump at one-third engine speed. Ordinarily this pump aspires pure air, and, through a pressure regulator, maintains a certain pressure on the lubricant tank set with the frame under the driver's seat. This pressure drives the oil through a single feed pipe to the dash distributor, thence through five leads to the crank chamber, to the overhead camshafts and to the pump and magneto shafts in front. There is no provision for oiling the cylinder walls, except by the oil working out of the main bearings and kept in suspension within the motor. As soon as the oil returns to the base chamber it is drawn up and returned to the tank.

Another feature is the provision for taking up wear on the brakes while the car is travelling at high speed. Steel cables attached to the brake levers are brought through the frame and hooked on to short sliding sleeves on a tubular cross member. These sleeves are connected to a

horizontal screw with left and right hand threads by means of which they can be brought closer together, thus shortening the length of the cable. The screw is just under the floor boards and can be reached by lifting a trap.

The Sunbeam driven by Grant is the only six-cylinder in the race. It has a cylinder displacement of 278 inches and is equipped with Silver-town cord tires and a Bosch magneto.

Sunbeams Have Glorious Past.

The Sunbeam fours, to be driven by Oldfield and Porporato, are similar in design to the racing cars by which a 12-hour record was established at the Brookland's track in England of 89.95 miles per hour. Owing to the very short wheelbase, the transmission system has been re-designed and has only two forward speeds. It is

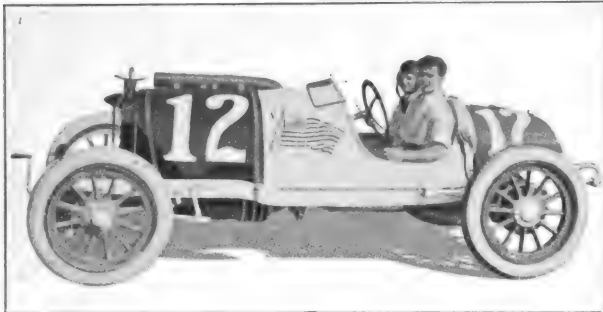
TABLE OF CONTESTANTS.

Of the 41 cars that were entered for the race only the following 25 survived the elimination trials. Many of the missing drivers could not get their cars in shape to be on hand for the eliminations. Although the first entries were as numerous as usual, the smallest field in the history of the race will start:

No.	Car	Wt.	Cyl.	B. & S.	P. Dia.	Driver	Nation
1	Maxwell	2100	4	3.8x6.8	298	Carlson	America
2	Maxwell	2100	4	3.8x6.8	298	Rickenbacher	America
3	Maxwell	2100	4	3.8x6.8	298	Tom Orr	America
4	Merceden	....	4	3.7x6.5	274	R. de Palma	America
5	Sunbeam	2240	4	3.7x6.3	270.9	J. Porporato	Italy
6	Sunbeam	2240	4	3.7x6.3	270.9	Oldfield	America
8	Duesenberg	1950	4	4 x6	299	T. Alley	America
9	Duesenberg	1950	4	4 x6	299	O'Donnell	America
10	Cornellian	1000	4	2.9x4	103	Chevrolet	America
11	Delage	2340	4	4 x6	299	J. de Palma	America
12	Stutz	2250	4	3.8x6.5	296	Earl Cooper	America
13	Stutz	2250	4	3.8x6.5	296	H. Wilcox	America
14	Stutz	2250	4	3.8x6.5	296	G. Anderson	America
15	Peugeot	2000	4	3.7x6.9	274	Dario Resta	America
16	Peugeot	1700	4	3.1x6.1	183	George Bahecock	America
17	Peugeot	1700	4	3.1x6.1	183	Le Cain	France
23	Bugatti	1800	4	3.9x5.9	300		
25	Emden	2200	4	4.3x5.3	298	H. G. Donaldson	America
29	Sebring	2100	4	4 x6	299	J. Cooper	America
30	Sunbeam	2250	6	3.2x5.9	278	H. Grant	America
32	Cino-Purcell	2350	4	4.4x5	299	Cox	America
33	Burman	2250	4	3.6x7.1	298	Burman	America
37	Kleinart	....	4	5 x6	299.5	Klela	America
38	Mala	2450	4	4.4x5	298	Mala	America
39	Duesenberg	1950	4	4 x6	299	R. Mulford	America

N. B.—Bore and stroke are approximate, piston displacement exact.

carried on the same sub-frame as the engine and the whole arrangement is suspended at three points from the main frame. Two carburetors



One of Duesenberg Cars in the Race.

are used to assure ample gas supply.

As compared with the standard Sunbeam chassis, modifications in the oiling system have been adopted. The bulk of the oil, instead of being carried in the base chamber, is in a tank at the rear of the chassis, from which it is led to a pump in the base chamber by means of a large pipe. This pump forces the lubricant to all bearings, after which it returns to the base, when it is forced back into the tank by a secondary pump. This prevents the oil from being subjected too long to the heat in the crankcase.

Although none of the cars entered in the race has a weight of more than 2450 pounds, the little Cornelian, which Louis Chevrolet will drive, is the most sensationally light car. It weighs less than 1000 pounds. That is less than five times the weight of its driver.

This extreme light weight is attained by some new ideas in design. The car has no frame, and the weight between the axles is carried on a bridge formed by the shell of the sheet steel body. A remarkable streamline body is produced without angles or corners, and the construction is said to be amply strong.



Chevrolet in the Little Cornelian.

The seat, both bottom and back, is suspended entirely free from the sides of the car on two long half-elliptic springs, which produces very remarkable riding qualities. The motor is a four-cylinder, cooled by thermo-syphon system. The valves are in the head and the cylinders are $2\frac{7}{8}$ -inch bore by four-inch stroke. Piston displacement is 103 inches. This is only a little more than a third of the size set as the limit. The car has constant level circulating splash system of lubrication. There are two main crankshaft bearings and the crankshaft itself is of exceptionally large size.

The transmission is a sliding gear type, with two speeds forward and reverse. All transmission bearings are of the ball type. The clutch is a leather faced cone. Atwater-Kent ignition system and Holley carburetor are used. The axles are of the flexible type, that in the rear being similar in construction to the one used for many



Billy Carlson Speeding in His Maxwell.

years on the French De Dion Bouton. Transverse semi-elliptic springs are used in front, and at the rear there is a platform of three transverse semi-elliptic springs.

Big Gasoline Mileage Possible.

The car is said to be able to run from 30 to 35 miles on a gallon of gasoline, and, as Chevrolet's car has been equipped with an especially large gasoline tank, he expects to be able to run the race without stopping for gasoline or tires. The car was designed by Blood Brothers, Allegan, Mich., who will shortly begin to produce it commercially.

The three Duesenberg cars are not strangers in the big race. One of them took a place last year. They are the product of the Duesenberg Motor Company, St. Paul, a concern which specializes in motors for automobiles and motor boats. The engines have $3\frac{63}{64}$ -inch bore and six-inch stroke, resulting in a piston displace-

ment of 299 inches. The cylinders are cast en bloc and are very close coupled, so that a short motor is produced.

The crankcase is of the barrel type, and carries the motor lubricating oil. The crankshaft has only two main bearings. The front bearing is four inches long and the rear $4\frac{1}{2}$. The connecting rod bearings also are unusually large and are fitted with laminated shims, which make possible adjustments to $1/1000$ of an inch. Pistons are made of a light alloy steel and are so designed that they are effective in carrying away heat from the head of the cylinder through extensive light ribbing.

The cars are equipped with Rudge-Whitworth wire wheels and Riverside tires, 33 by $4\frac{1}{2}$ front and 33 by five rear. Timken bearings are used in all wheels, and New Departure bearings are installed in the transmission.

tore the wall out for about 18 feet and the car turned over five or six times on the dirt. De Palma and his mechanic were not injured, and the damage to the car is not yet known. As there was a week left to get the car in shape for the race it is possible it may start.

Ball bearings are used in this Delage, and to secure rigidity, as well as lightness, an H section girder is carried under each main bearing. The motor is placed directly on the main frame members, while the five-speed gear box has three-point suspension. The clutch is a multiple disc. Two independent magnetos are fitted, and each cylinder has four horizontal valves, operated by vertical push rods and bell cranks.

A gear pump, driven off the intake camshaft, delivers oil through a collector, in which are a hand regulated valve and three leads—one to the main bearings, one to the overhead valve gear



The Emden is a special car, built by three Donaldson brothers of Milford, Ia. The bore is $4\frac{1}{2}$ inches and the stroke $5\frac{1}{4}$ inches, yielding a piston displacement of 298 inches. The weight of the car is 2200 pounds. Rudge-Whitworth wire wheels are equipped with 34 by $4\frac{1}{2}$ Goodrich Silvertown cord tires. Truffault-Hartford shock absorbers, Bosch double-distributor magneto and Rayfield carburetor are employed. A mineral oil, known as Oilzum, is used as a lubricant.

The Delage That Won Last Year.

John de Palma, brother of Ralph de Palma, succeeded in passing the elimination trials in the Delage car which, with Rene Thomas at the wheel, won the race last year. After qualifying he went for a spin on the track when it was wet and skidded through the new retaining wall at one of the curves. The strength of the impact

and one to the dashboard pressure indicator. The function of the pump is limited to supplying lubricant to specially designed cages around each ball bearing.

In addition to the oil in the base chamber there is an auxiliary tank on the dash with a feed to the motor, the flow from which is regulated according to the conditions under which the motor is running. To prevent an excess, in case of inattention, or any other reason, there is an overflow on the side of the chamber, the superfluous oil being lost on the road.

Burman's Car Special Peugeot.

Burman's special car is an old Peugeot, in which he has installed a motor of his own design. This motor has 16 valves in the head, operated by an overhead camshaft. The cylinders have 3.6-inch bore by 7.1-inch stroke.

An attempt was made by Burman to enter

this car as a Burman special, instead of as a Peugeot. Rival teams felt that if this were permitted the Peugeot would be represented by four cars, while they were held to the three permitted by the regulations. Ray Harroun, the Maxwell chief engineer and racing manager, therefore entered a special Maxwell under the name of Harroun special and announced that while the car was slightly different from the other Maxwells, it had been built in the Maxwell factories and after the race would be known as a Maxwell. This had the effect of having the Harroun special classed as a Maxwell and Burman's car classed as a Peugeot, which was what Harroun had sought to accomplish.

The Bugatti, which Barney Oldfield was

If Oldfield, or some other driver, takes the Bugatti into the race it will be the only car entered with chain drive. A dry plate disc clutch and a four-speed gearset are used. The car weighs about 1800 pounds.

The F. R. P. cars, which could not be put in shape in time for the race, contained some very interesting new Knight engine designs. They may be perfected for some of the later speedway races. The valve sleeves are operated by two eccentrics instead of one. An auxiliary exhaust port has been installed close to the lower end of the valve sleeve. The port areas are larger than usual and the sleeve stroke shorter.

With these changes it is said to be possible to run these motors as fast as 5000 revolutions



Officials of the Speedway Company, Under Whose Auspices the 500-Mile Race Is to Be Held.

booked to drive, was built especially for racing by Ettore Bugatti, an Italian, living in Molsheim, Alsace, Germany. Bugatti is said to have been responsible in a consulting capacity for much of the excellent design in French racing cars.

The car was built with a larger piston displacement than is permitted in the race. So it was taken to an American factory, where a crankshaft was designed that would permit a shorter piston throw, in an effort to bring it within the regulations. This alteration threw it out of tune and it did not work well in the elimination trials, although Oldfield managed to qualify with a speed of slightly more than 81 miles per hour. He later took a Sunbeam through the eliminations and it will not be known until the day of the race which car he will drive.

per minute. Horsepower curves show that they develop 122 horsepower at 3950 revolutions per minute. They weigh 1910 pounds.

Mulford failed to get the special car which he had been building at his Brooklyn shops ready in time, and so he qualified in a Duesenberg. His own car had 3 11/16-inch bore by seven-inch stroke. It has an offset crankshaft, and two camshafts with only three timing gears. Two independent oiling systems and two independent ignition systems were installed.

New Stutz Has 16 Valves.

Some details of design in the Stutz racing cars will be kept secret until after the race. They are not stock cars, however, being the first strictly racing types produced at the Stutz factory. Their four-cylinder motors, cast en bloc, are 3 3/16 inches by 6.5 inches. They have 103-

inch wheelbase. They use Houck wire wheels and Goodrich Silvertown cord tires.

The motors have 16 overhead valves, operated by an overhead camshaft. The valves enter the cylinder at an angle between horizontal and vertical. The crankshaft is carried on three main bearings of the ball type. The motor is oiled by a combination force feed system, which delivers oil independently to the ball bearings of the crankshaft and through the hollow shaft itself to the lower connecting rod bearings. The pistons are very light, and the motor reaches its greatest efficiency at about 2800 revolutions per minute. The weight of the car is 2150 pounds. The rear system is similar in all details to that employed on stock Stutz cars.

Ralph de Palma's Mercedes, which once won a Grand Prix in France, and has taken two of the

Fifteen of the cars are equipped with Bosch magnetos, including the Maxwell, Stutz, Peugeot, Sunbeam, Mercedes, Duesenberg and Mais entries. Master carburetors are used on three Maxwells, one Sunbeam, one Peugeot and two Duesenbergs. Two of the Stutz cars have Stromberg carburetors. One Peugeot and one Stutz are fitted with Zeniths. Schebler carburetors are used on one Duesenberg and a Sebring. The Mais uses a Rayfield and the Cornelian a Claudel, while Ralph de Palma's Mercedes is fitted with a Packard carburetor. These figures are not complete and there are doubtless other cars fitted with some of these carburetors and magnetos.

Many Great American Drivers.

An exceptionally complete list of the great American drivers will compete in this year's race. Many of the men who have been driving



A Bird's Eye View of the Speedway Track at Indianapolis, Ind.

fast Elgin road races, is in the best of trim. He made the fastest time of any car in the elimination trials and was only a small fraction under the record for the track. The car has been completely overhauled at the Packard factory and fitted with a streamline body of new design, which is said to reduce wind resistance to the minimum. It has been fitted also with a Packard carburetor. The motor is $3\frac{5}{8}$ by six inches, and the car weighs about 2300 pounds. Wheelbase is 110 inches.

The Cino-Purcell is a Cincinnati car that has been very successful in the past in competing in hill climbs, but has not previously been entered in the big race. It is heavier than most of the other cars, tipping the scales at 2450 pounds. The Kleinart is a special car designed and built by Arthur Klein, its driver. The Mais is a car about which information is scarce and the same is true of the Sebring, which J. Cooper will drive.

racing cars since racing first became an established sport are among the entrants.

Bob Burman, and his old team mate of the days when the Buick was a great leader of the racing game, Louis Chevrolet, will both appear in the race. Burman has made racing his steady occupation since he began with a Jackson car at Detroit in 1906. Lately he has been a prominent member of the Peugeot team, but until he took first place in the Oklahoma City races, the last big event before the Indianapolis contest, he had not been especially successful of late.

Chevrolet has been a manufacturer during the past few years, devoting himself to the production of the Chevrolet car. Lured by his memory of the excitement of his racing days, and much attracted by some of the features of design in the sensational little Cornelian, he offered himself as the pilot of that car. He weighs 200 pounds and his car less than 1000. It is unneces-

sary to say that the combination is one of the most interesting to be seen at the track.

The Stutz team, since that car broke suddenly



Gil Anderson in One of the New Stutz Racers.

into the limelight at Indianapolis several years ago, has been consistently successful. It is composed this year of tried and proven veterans. Earl Cooper is its great leader and his companions are Gilbert Anderson and Howard Wilcox.

Star Drivers of the Stutz.

Cooper was the American racing champion in 1913, when he won six out of seven of the long distance events in which he was entered. He has driven Stutz cars since they appeared, in 1911. Gilbert Anderson is a young Norwegian-American, who also has been with Stutz since 1911. He has been in several of the big Indianapolis races, but accidents have prevented his winning. He won the Elgin national trophy in 1913.

Howard Wilcox is a veteran who will handle a Stutz this year for the first time. In 1912 he won a place in the 500-mile race, while his team mate of that year, Joe Dawson, won with another National. Last year Wilcox drove a Grey Fox car.

Jean Chassagne, the racing engineer of the English Sunbeam factory, and Louis Coatalen, the adventurous chief engineer and production manager, could not get away for the race, owing to the press of work involved in supplying England's military forces with motor cars.

One of the cars they were to drive will be piloted by J. Porporato, an Italian driver, who won the Torgo Bologna several years ago, but has not, since that time, been much in the racing public. He is a driver of very excellent parts, however, and is expected to make a fine showing in this race.

Barney Oldfield, the great star of the early days of racing, when he made a national reputation with the old Peerless "Green Dragon," will possibly be Porporato's team mate on the day of the race, unless he decides to drive the Bugatti.

He has won a great many races this year. Among them were two consecutive firsts at Venice and Tucson. He was then driving a Maxwell car. His winnings this year are said to have been greater than those of any other driver on the American circuit, although the events in which he has been successful have not been so prominent as those won by others. He was the first American to win a place in last year's race.

The Peugeot team is headed by Dario Resta, whose record to date brings him very near to the championship, with two most conspicuous events run on the Coast to his credit. He is supported by George Babcock and Le Cain. Frank Galvin was booked to drive a Peugeot, but he was injured, with his mechanic, when his car turned over in practise on the speedway. Le Cain, who takes his place, has been connected with the Peugeot team in a minor capacity and not much is generally known about him.

George Babcock was a mechanic for Harry Grant in the days when that driver won fame by capturing two Vanderbilt cups. He drove a car for himself the first time in Sioux City, last year, where his mount was a Sunbeam. At Corona, Cal., he led the field with a speed of 96 miles an hour until he struck a bull dog and broke a steering connection.

Mulford to Drive a Duesenberg.

Ralph Mulford, who will drive a Duesenberg, is one of the oldest of the veterans. He is one of three drivers who have never missed a 500-mile Indianapolis event since the race was instituted. He took third in the first race, but has not since been able to place, although he has won a great many other events.

Erwin Bergdoll, his brother Grover, and Willie Haupt, all of whom are excellent drivers, with successful individual histories, were thrown out of the race by their inability to get their cars to the track in time for the elimination trials.



Bob Burman in a Practise Spin.

This is true also of the members of the famous Mercer racing team. Eddie Pullen, holder of the world's road racing record, 87.7 miles per hour,



Ralph de Palma, Who Made More Than 98 Miles an Hour.

made at the Corona course last year, is the leader of that organization. His team mates are Glover Ruckstell and Louis Nikrent, two young Californians. Ruckstell was running second to Pullen's record breaking flight when he ran out of gas within a few feet of the tape and was unable to finish. Louis Nikrent has shown great promise on the Coast, but has not yet established himself as a winner.

The Maxwell team, whose triumphs this year have been numerous, is headed now by Eddie Rickenbacher, a very well known driver, who began his racing career in 1910. He drove a Firestone-Columbus car in the first 500-mile race in 1911. So far, 1912 has been his best season, when he stood third among American drivers in the number of prizes won. He was driving a Mason car at that time. Last year he won 10th place with a Duesenberg.

Billy Carlson had done some racing on the Coast, but was practically unknown until he finished third in the 1913 Vanderbilt cup, with a Mason car. He took ninth place in the 500-mile race last year.

Tom Orr is an old-time race man who has been Ray Harroun's assistant as chief engineer of the Maxwell Motor Company. He is very close to his chief and has his entire confidence as a racing driver.

Eddie O'Donnell will drive a Duesenberg. He broke two world's records in two of the first races he ever drove. Tom Alley will drive another Duesenberg. He was at one time Ralph de Palma's mechanic. In Minneapolis, on Oct. 24, 1914, he beat de Palma, Mulford and Burman. Ralph Mulford will drive a Duesenberg, also. His first race was run in a Lozier at the Point Breeze track in Philadelphia in 1907. He once set a new world's 24-hour record. He won the Elgin national trophy in 1910 and the Vanderbilt cup in 1911. He won a 200-mile race

at Columbus in a Mason during the 1913 season and won several other events with that car.

Hugh Hughes, who has driven in every other 500-mile race, will be prevented from competing in this one by the fact that the F. R. P. team, of which he is leader, did not qualify. Although he is only 29 years old, he drove a de Dietrich in the 1904 Gordon Bennett cup race. Charles Keene is another F. R. P. driver who will not appear.

Harry Grant, twice winner of the Vanderbilt cup, is entered to drive a Sunbeam six. His great winnings were made in the Alco. Later he drove a Lozier and an Isotta. He has contested in all of the 500-mile races so far.

Harry Grant Donaldson of Milford, Ia., with his brother, L. C. Donaldson, as his mechanic, will drive the Emden. A third brother, R. C. Donaldson, figures as the entrant of the car. The trio has been much impressed by German exploits in the present war and in addition to building an Emden for the Indianapolis race, named after the famous German light cruiser, they have a U-9 under way to take part in racing events at Sioux City during the summer.

Art Klein, who will drive a special car of his own design, called the Kleinart, began his automobile career as a tester for the Peerless Motor Car Company. He was later connected with the Stoddard-Dayton racing team and has before driven in the 500-mile sweepstakes. C. C. Cox will drive a Cino-Purcell. He is a southern driver who has still to make his reputation.

Officials for the Race.

Officials in charge of the race are David Beecroft and F. A. Croselmire of New York, American Automobile Association representatives; A. R. Pardington, Detroit, referee; F. L. Edwards, director of contests, Chicago Motor Speedway, chairman of technical committee, and Tom Hay, Chicago, starter.

This staff comprises the most expert men at



The Emden with the Donaldson Brothers Abroad.

their various branches of the work. Beecroft, Pardington and Edwards have officiated at every speedway race since they began to be held at the Indianapolis. Hay and Croselmire have each had one year's experience. Hay is an old bicycle team mate of Carl G. Fisher, president of the Indianapolis Speedway Company.

During the year an improvement has been made in the speedway construction, which is expected to prevent many serious accidents. It was given a trial by an accident that occurred during practise recently and saved a driver from serious injury and perhaps the wrecking of his car.

This is a safety wall all the way around the course. George Babcock, one of the Peugeot team, had a blow-out during a fast trip over the track and slid over onto what would have been a soft strip of earth if the retaining wall had not

exhibit includes a car of each design of this season's models produced by the Willys-Overland Company. Among the features is a polished model 80 chassis, and the model 81 roadster that made such an excellent showing in the Grand Prix and Vanderbilt Cup races held several weeks ago in the Exposition grounds.

BAY STATE A. A. OUTING PLANS.

The committee in charge of arrangements for the annual outing of the Bay State Automobile Association, June 16 and 17, have chosen the Farragut house at Rye Beach, N. H., as the place where it is to be held.

An effort is being made to induce every member of the association to make up a party to attend in order to secure the largest attendance and most successful outing that the association has ever had.

The Farragut house is situated on the Atlantic, between Newburyport and Portsmouth, an easy afternoon's ride from Boston. The features of the programme include a blind time run, the details of which are to be announced later.

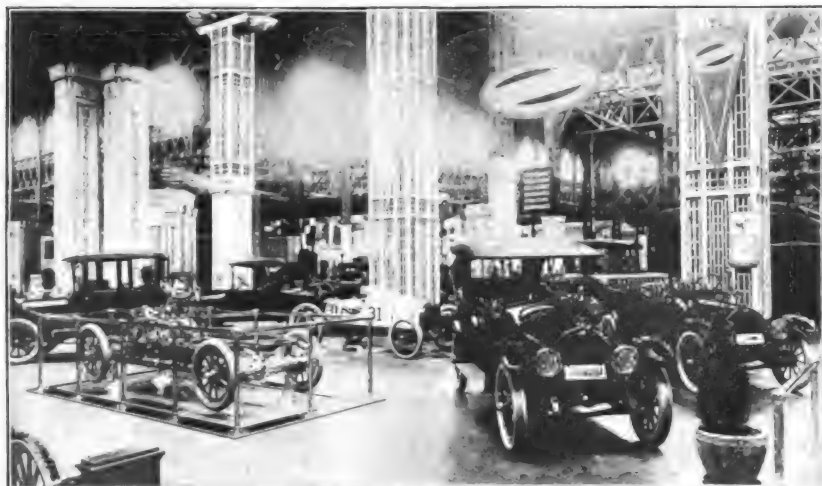
There will be a banquet on the night of June 16, to be followed by a dance in the pavilion at Rye Beach. In the morning there will be a programme of gymkhana games in which both men and women may participate. The annual ball game between the "Mutts" and "Jeffs" will take place in the afternoon.

There also will be a golf tournament and tennis matches. Provision will be made for the accommodation of chauffeurs.

RACE PICTURES FROM INTERSTATE.

An Interstate car will be used by Coburn Brothers of Indianapolis in making moving pictures of the 500-mile Sweepstakes on Memorial Day. It will be furnished for the purpose by George M. Kanouse of the Kanouse Automobile Company, Interstate distributors for Indiana.

The first Cole "Eight" to leave the United States was driven through to London, Ont., from Indianapolis recently by J. L. Hendrick of London, who travelled to the factory for it.



The Overland Exhibit in Transportation Building at the Panama-Pacific Exposition.

been there to stop him. Instead of digging the front end of his car into the earth and turning a somersault, as many racing drivers have done before him, Babcock simply struck the concrete wall, slid along and finally came to a stop. The wall was built at a considerable expense to prevent just such accidents.

The wall gave way when John de Palma's Delage struck it, but it saved the driver and mechanic from serious injury.

OVERLANDS AT THE EXPOSITION.

Among the large number of automobile exhibits in the Transportation building at the Panama-Pacific Exposition at San Francisco, the exhibition of Overland cars is attracting a large share of the visitors' attention. The Overland

FOREIGN ARMY MOTORS AND DRIVERS.

THE employment by the British of numerous technical graduates and engineers in connection with motor transport and the other me-



Special English Built Motor Truck for Transportation of Army and Navy Sea Planes.

chanical appliances of war that require the services of the engineer, has led to an agitation which demands that the officers of those services be accorded an equal social standing with staff and line officers.

The subject has received much attention from the motor-ing publications. Several expedients have been suggested. One is that such officers should be especially signaled out by the King for recognition, which would put them on the same social plane as the officers of the other services. Another is that they should be trained at Woolwich, the military school, where other officers receive their training.

As it now stands, thoroughly trained mechanical engineers operating the truck transport divisions are under the command of officers of the line who know very little about motor trucks, and this is said to have brought about a great deal of overloading, abuse of trucks, and accidents that might otherwise have been avoided.

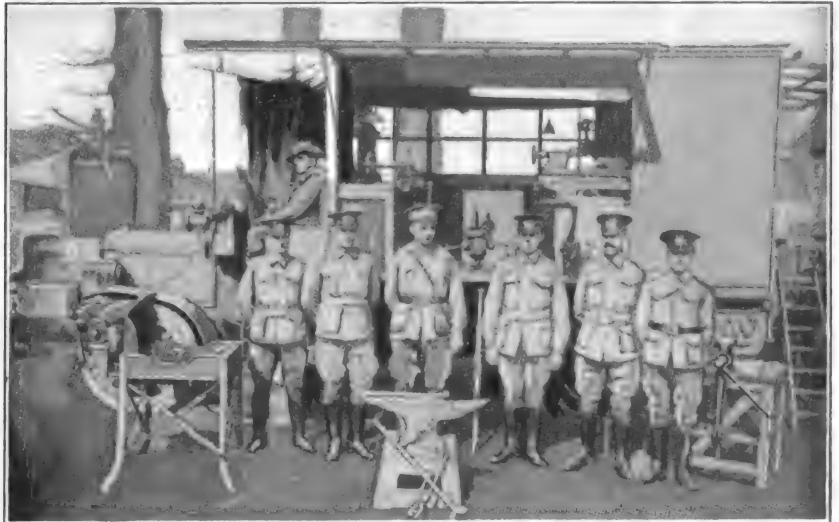
TRUCKS HAUL SEA PLANES.

Special trucks are in use by the English army and navy to transport from place to place the sea planes that are in use for scouting work along the coasts and over the channel. These trucks are so arranged that the planes may be mounted upon them with a minimum of disassembling. The trucks make good speed, not as great, of course, as a touring car, but faster than the ordinary transport truck.

MANY TRUCKS WITH AUSTRALIANS.

A section of motor transport was raised in South Australia, where 38 units were commandeered there and taken to Melbourne and organized into a transport division. To keep these units in efficient service, motor repair shops were organized, the machine tools being carried on a truck chassis which also, in transit, bears the anvils, forges and other equipment necessary to keep the units at high efficiency.

The illustration herewith shows an Australian motor repair shop mounted on an English Commer car chassis. These repair shops were installed at the Newport railway works in Australia at a cost of about \$25,000 each. They



Motor Repair Shop for Military Purposes Used by the Australian Army.

average about one ton lighter than the motor repair shops in use by the English section of the army now fighting on the Continent.

RENE M. PETARD RETURNS TO ARMY.

Rene M. Petard, chief engineer of the L-P-C Motor Company, makers of the Lewis Six, was in France when the war broke out and joined his regiment. He was seriously wounded at the battle of the Marne, on Oct. 29, 1914, and was discharged in February of this year. A serious wound in the hip left him incapacitated for duty in the trenches.

Consequently he was commissioned a lieutenant of the Thirteenth French artillery and was placed in charge of the motor experts, many of them noted French race drivers who handle ambulances, supply trucks, ammunition wagons and officers' cars. He is shown among his men



French Military Motor Drivers and Experts and Their Chief, Rene M. Petard, Who Is Indicated by an Arrow.

in the accompanying illustration, which was taken near the front. The name of the place was censored by the French government.

RUSSIA TO USE ALCOHOL.

Agricultural and industrial interests connected with the production of vodka in Russia, which was banished at the beginning of the war, have been in a quandary since then to dispose of their alcohol. To aid them the Russian government is seeking to find new ways to use alcohol for technical purposes. Prizes totalling \$136,475 have been offered for new inventions that will make it possible to use it in larger quantities. These include a prize of \$2575 for the perfection

of devices enabling the use of spirits in internal combustion engines. The contest is international and is open to competitors everywhere.

NEW FRENCH ARMORED CAR.

A new French armored car, with steering equipment at either end of the chassis and a speed of 60 miles per hour forward and 20 miles per hour backward, has been placed in service. This car carries four machine guns and is protected with armor which will withstand a bullet fired only a few feet away. Artillery of considerable weight is the only weapon that will injure the car.

Count de Lambert and Paul Tissandier, who were two of the first pupils of Wilbur Wright in aviation, are responsible for the design of the vehicle. The car is mounted on a Gobron chassis with an 80-horsepower engine, having 4.3-inch bore and 9.8-inch stroke, and double pistons. Double piston motors have been made by the Gobron company for 12

years and were very successful in the early races. The car is fitted with a four-speed transmission and is chain driven. In addition to the ordinary steering gear, the front wheels are controlled by steel cables, which can be manipulated by a boat type of steering wheel at the rear of the car. The machine is normally driven forward by the driver at the front steering wheel, but if the vehicle is driven backward it is guided by the rear steering wheel by another driver, who has vision through a sight opening in the armor.

The armor plate is four millimeters thick and covers practically the entire car. There is a door on the left side which admits to the single compartment inside.

KINGSLEY SAFETY FEDERATION HEAD.

The Safety First Federation of America has chosen Darwin P. Kingsley, president of the New York Life Insurance Company, as its head. Besides being president, he is member of the executive committee and of the board of directors.

The federation will conduct a country-wide safety campaign of education in an effort to produce a public sentiment that will bring about the enactment of desired laws and ordinances. In accepting the position, Mr. Kingsley said:

"Everybody needs to be educated as to what they should not do on the streets, especially in the larger cities. Street traffic has been revolutionized in 20 years. The old way of crossing a street will no longer do. A dog no longer runs against or under an automobile, as he did when it first appeared. He has changed his whole attitude toward street traffic. The average man has not changed, but still wanders aimlessly across the street as he did before there were automobiles.

"On the other hand the traffic, as against the pedestrian, has grown aggressive and careless. The power that lies in gasoline has crept into the brains of the auto drivers. How brutal and offensive some of them can be was shown recently when many New York traffic police were on parade, leaving the crossings unguarded."

The federation has established headquarters in the Craftsman building, 6 East Thirty-ninth street, New York City. The other officers of the organization are police commissioners and safety directors from the cities of 14 states.

A. A. A. MEETING IN BOSTON.

Speaking at the banquet of the American Automobile Association in Boston, Mayor Curley of Boston said he had been informed by local business men that while the average life of a motor truck in New York City was six years, in Boston it was never more than four. This was attributed to the Boston street pavements. The mayor pledged his efforts to remedy the condition as rapidly as possible.

Col. William D. Sohler, chairman of the Mas-

sachusetts Highway Commission, thought that automobile men should use their combined influence with the newspapers to suppress the news of automobile accidents, which, he said, were given more prominence than those caused by trolley cars or other vehicles.

George C. Diehl of Buffalo upheld the newspapers, saying that the co-operation and publicity given by them had made the good roads movement successful. President James H. MacAlman of the Boston Automobile Dealers' Association, spoke of the progress made by the business during the past few years, mentioning particularly the change in the attitude of the public from antagonism to support.

The meeting passed a resolution condemning the double taxation of motor cars, which is common in some states. The following officers were elected for the coming year: President, James



Servian Government Ordered 31 KieselKar Ambulances of This Type for Its Armies.

A. Wilson of Franklin, Penn.; first vice president, H. M. Rowe of Maryland; second vice president, Ralph W. Smith of Colorado; third vice president, P. J. Walker of California; fourth vice president, H. J. Clark of Minnesota; fifth vice president, Preston Belvin of Virginia; secretary, John N. Brooks of Connecticut; treasurer, H. A. Bonell of New Jersey; chairman of the executive board, A. G. Batchelder of New York.

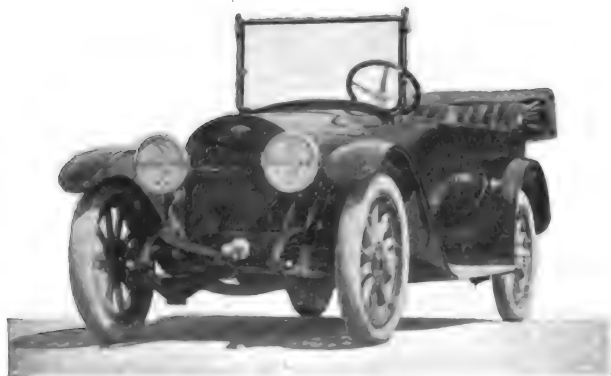
A bill has been introduced into the Minnesota legislature providing for the appropriation of \$200,000 for the construction of a permanent speedway at the Minneapolis state fair grounds, where very successful annual meets have been held. The construction, maintenance and complete responsibility of the track would be placed in the hands of the State Agricultural Society.

NEW ABBOTT-DETROIT "EIGHT".

THE new Abbott-Detroit "8-44," which, except for the motor, is practically a continuation of the well known Abbott-Detroit model F, has reached the stage of commercial production and is now offered to the public by the Consolidated Motor Car Company of Detroit.

The motor is a special Abbott design, built by the Herschell-Spillman Company, a concern which has long specialized in eight-cylinder aeroplane engines and is now producing a large number of eight-cylinder motors for automobiles.

It is of the "V" type, with unit power plant. Cylinders have three-inch bore and five-inch stroke, and are cast en bloc. There is a single camshaft with 16 integral cams. Cylinder blocks



The New Abbott-Detroit Model "8-44."

are staggered by an amount equal to the width of the connecting rod end bearings. By this arrangement the double eccentric crank pin bearing arrangement common to other eight-cylinder motors is done away with. Instead, the connecting rods work side by side on the crank pins and are interchangeable, as they are I beam sections, drop forged, with two-bolt cap constructions. The motor bearings are veneer bronze, faced with white bronze. There are three crankshaft bearings.

The carburetor is of improved Zenith type of special design. Gasoline is fed by a patent vacuum system. Ignition of the Remy battery system is supplied, and lighting and starting is accomplished by the Electric Auto Lite installation.

The clutch is a noiseless dry plate type with 17 units, every alternate plate being faced with Raybestos. The transmission is made by the Warner Gear Company. It is of the selective

sliding gear type with three speeds forward and reverse. Chrome nickel gears and nickel steel shafts are used. The gear ratio on direct drive is four to one.

The rear axle is of special Abbott design, and has previously been used in both fours and sixes. It has established a very good reputation for durability. It is of the full-floating type, with nickel steel gears and shafts. The housing is a steel casting arranged so that the outer shell and annular frames supporting the differential bearings form a truss, holding the gears in perfect alignment.

Springs are of underslung construction, built of spring steel, oil tempered and heat treated. They are semi-elliptic front and three-quarter elliptic rear. Wheels are of artillery type and the wheelbase is 121 inches.

The front axle is a drop forged I beam section, double heat treated, with a tie rod at the rear. Steering gear is placed on the left side, with control levers in the centre.

The body is an attractive streamline design with a roomy tonneau—so roomy that seven passengers can sit in it in comfort. An instrument board finished in black walnut, with all instruments set in flush, adds to the appearance of the interior.

Equipment includes a one-man top, "Jiffy" curtains, top envelope, windshield, speedometer, license holder, tire carrier in rear, robe and foot rails, electric horn, pump, jack, full set of tools and repair outfit.

BROADWAY STORES WANT 'BUSSES.

Merchants in the Herald square retail district of New York City have petitioned the Board of Aldermen to amend the franchises of the proposed 'bus lines for the city so that the routes will bring passengers to the district in which their stores are located. At present the route is planned to go down Seventh avenue, which is a long block away.

A cablegram from Paris to the officials of the Packard Motor Car Company, Detroit, Mich., announces that the service station of the company there has been taken over by the French government. A large number of Packard trucks have recently been delivered to the French army.

COAST TO COAST IN 11 DAYS.

In a Stutz "Bear Cat" roadster, E. G. Baker of Indianapolis and W. F. Strum, an Indianapolis newspaperman, arrived in New York City May 18, ending a record cross continental trip of 3728 miles. That distance was made in 11 days, seven hours and 15 minutes.

This breaks all previous records for cross continental driving, the more so because one man drove the car all the way. Hitherto some similar trips in slower time have been made by relays of drivers. Last year Mr. Baker rode a motorcycle across the continent, by a road 350 miles shorter, in 11 days 12 hours and five minutes.

The duty of the newspaperman was to take notes of everything of interest along the way and to get signed statements from garage men showing just where the car had been and the quantity of supplies taken aboard in various places. His records are so complete that there can be no doubt of the authenticity of the men's claims.

The only mechanical trouble experienced on the trip was the breaking of a pair of shock absorbers. Curiously enough the motor in the car was one that was taken from a car sold to a New York City customer because he was dissatisfied with it. The two front Goodyear tires came through the trip with California air in them. Two new tubes were used in the rear casing because of punctures and burn outs.

The car made 409 miles the first day, plowing through sand and snow storms over a road that ranged from 5000 feet above to 300 feet below sea level. The first day's run ended at Phoenix, Ariz. The second day the crew made 592 miles, ending at El Paso, Tex. There was mountain climbing that day up to 7700 feet. The car got caught in quick sand near Roswell, N. M., and four horses were necessary to pull it out. That day only 244 miles were made. On the next day's ride to Plain View, Tex., the time was slow, it being necessary to open and close 50 ranch gates. Washouts were encountered in Oklahoma, and it was necessary several times to dig the car out. On the sixth day the car reached Emporia, Kan., having made in that time 2119.1 miles. It will be noted that by far the fastest time was made in the Far West, which is an interesting comment on the improvement of the roads in that section.

MAKE MOVIES OF THE LINCOLN 'WAY.

Two newly finished touring cars left New York City, Saturday, May 15, carrying a complete moving picture equipment to cover the

route of the Lincoln highway from coast to coast, and take pictures of every interesting scene the photographers are able to discover.

Mayor Mitchell and his staff stood in the archway of the City hall to see the cars off and testify by his presence to the importance of the undertaking. A few minutes earlier, Henry B. Joy, president of the Lincoln Highway Association, had wired Mayor Mitchell as follows:

"I ask your honor to start on the way the official Lincoln highway motion pictures cars and staff. The establishment of the Lincoln highway, the picturing of its possibilities by moving pictures, will open America's great scenic playgrounds, including the national parks, to tourists, will create throughout the wonderful West hotels and highways superior to those of Switzerland, and make that great western third of the United States a bee hive of tourists seeing 'America First.'"

The tour is directed by A. R. Pardington, vice president of the association. The Packard "governor special," which leads the two cars, has two Lincoln 'way brassards emblazoned on its door panels. It was especially finished for this trip and is driven by Thomas Stalker, an expert, who was formerly the head of the Packard chauffeurs' school. This car is expected to carry 13 governors during the passage across the various states.

When the films of the route have been made they will be shown for some weeks at the Panama-Pacific Exposition in San Francisco and will then be displayed in other cities of the country. The various communities along the route are taking much interest in the project and every aid will be given the photographers in securing good pictures of points of interest in their localities.

BASEBALL FOR OVERLAND MEN.

The New York Giants and the Detroit Tigers will play a game of baseball in Toledo on June 21 for the benefit of the employees of the Overland factory. They will travel on special trains chartered by John N. Willys, and the entire expense will be borne by him. The Overland employees will see the game and receive their usual pay for the afternoon. Last year the Philadelphia Athletics and the Chicago Cubs furnished the show.

When the American Association team was in Toledo it was the practise of the Overland factory to close up for one afternoon early in the season and each employee was given a ticket to the game by the company. When the team was removed to Cleveland the plan of bringing in big league teams was adopted.

TEST OF STERNBERG TRUCK.

A seven-ton Sterling truck of standard stock construction, built by the Sternberg Manufacturing Company, Milwaukee, Wis., so thoroughly demonstrated its efficiency in a competitive test in New York City that an order for three machines, to be used in general haulage work in Greater New York, was the immediate result. The test was conducted for, and paid for by Richard Fitzpatrick, stevedore and trucking contractor, at the prevailing rates.

The test continued for a period of 10 days, during which time 216 loads, totalling 1360 tons, were hauled. The average length of haul is not stated, but these ranged from 18 to 30, and the tonnage from 110 to 186. Forty-nine quarts of oil and 175 gallons of gasoline were supplied

five-ton machine that was rated as having speed of 18 miles an hour. The mileage to the gallon of fuel cannot be given, for the length of the hauls is not averaged.

CANNOT INSURE MINORS.

When the state insurance department of New York was asked whether, in view of the fact that it is a violation of the state law for a minor to operate an automobile, it was optional with an insurance company to cover by special indorsement a minor under the age of 18, who is driving a car belonging to his parents, the insurance body quoted section 282, subdivision two of the highway law, as follows:

"No person shall operate or drive a motor vehicle who is under 18 years of age, unless such person is accompanied by a duly licensed chauffeur or the owner of the motor vehicle being operated."

The department also cited the opinion rendered by the attorney-general, July 28, 1910, which held that a minor may not operate a motor vehicle upon a public highway even though he may be the owner of such vehicle, and therefore the insurance department is of the opinion that it would be contrary to public policy to allow an insurance company to cover by special indorsement acts which under the law of

New York State are expressly declared to be criminal.

KISSELKAR STREET FLUSHER.

Motor driven street sprinklers and flushers, produced by the Kissel Motor Car Company, Hartford, Wis., have aroused great interest among city officials. The car will replace from six to eight horse drawn wagons. The nozzles are located at the front, instead of the rear of the car, where they are always under observation by the driver. The car will sprinkle an 80-foot street at one trip and will flush the same street thoroughly in two round trips.

It is expected that Maine's revenue from automobile registrations during 1915 will exceed \$200,000.



Sterling Seven-Ton Truck That Hauled 1360 Tons in 10 Days, Making 216 Round Trips.

during the test, as is shown in the following tabulation of each day's run:

Date	Fuel, gas, oils.	Oil, quarts...	Trips daily...	Gross tonnage	Less max. load capacity, lbs...	Average load in lbs.....
Sept. 4..15	4.15	1 1/2	8	50	12,500	1500
Sept. 5..22	7	30	185	12,333	1667	
Sept. 8..23	9	30	186	12,400	1600	
Sept. 10..15	18	110	12,222	1778		
Sept. 12..8	21	141	13,429	561		
Sept. 14..19	20	135	13,500	500		
Sept. 15..15	18	110	12,222	1778		
Sept. 16..14	29	182	12,552	1448		
Sept. 17..19	21	130	12,381	1619		
Sept. 18..15	5	21	12,476	1524		
	175	49	216	1360	12,592.60	1407.40

The Sterling truck's actual tonnage was 30 per cent. greater than that of any other truck in the test. The next best showing was made by a

GENERAL NEWS OF THE INDUSTRY.

Paige-Detroit Expands and Expects Double Production—Important Addition to Overland Management—Several Companies Declare Dividends.

INCREASED business for the Paige-Detroit Motor Car Company, Detroit, Mich., has made it imperative for the company to enlarge its plant, although it has been occupying its present factory only little more than a year. The immediate beginning of building operations in connection with a large addition to the plant was recently decided upon by the board of directors. When the new structure is completed and operations begun it is expected that the Paige production will be nearly doubled.

The building plans specify a three-story structure about 500 feet long and 60 feet wide, to fit into the general arrangement of the other units of the Paige plant in the form of a wing. The accompanying illustration indicates how the plant will appear when the new addition is complete.

The present capacity of the plant is about 80 cars a day and it is now and has been for some time running at the maximum. The expansion will raise the output to about 150 cars a day, making a total for the season of 15,000 Paige machines, which is said to raise the company to the rank of the largest producer of medium priced sixes in the world.

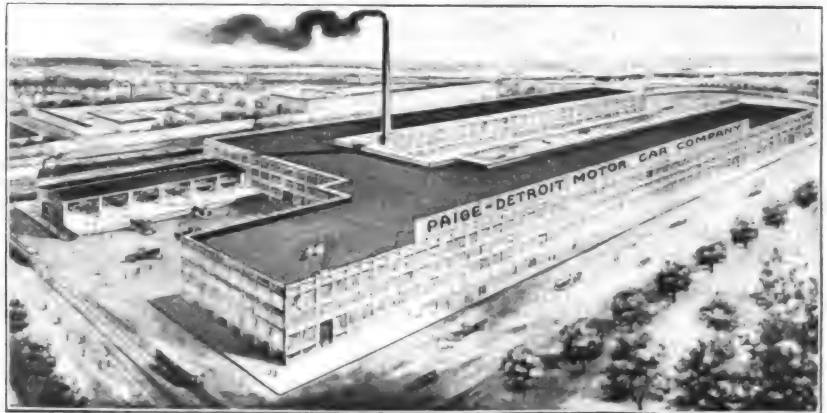
In addition to the extra floor space provided by the extension, the company will have a large equipment of new machinery and will institute improved methods and systems of manufacture. One feature will be a mechanical conveyor, by which a moving platform of the endless chain type will carry the car as it is being assembled from one group of workmen to the next in order of assembly, each group adding its parts until the completed car rolls off the conveyor under its own power.

The remarkable success met with by the Paige Six is said to be in large measure responsible for the growth of the business. Of this type of car, more than a million dollars worth was sold at the Chicago and New York shows

and in the sale of an extra allotment of 150 in Chicago during the single month of April. The Paige company is now in its fifth year and it has developed in that time from an output of 300 cars to its present dimensions.

DUNN JOINS WILLYS-OVERLAND.

A long personal friendship between John N. Willys of the Willys-Overland Company and Harry T. Dunn, president of the Fisk Rubber Company since its inception, has culminated in Mr. Dunn acquiring an interest in the Overland company and taking active part in its management as vice president and director.



New and Enlarged Plant of the Paige-Detroit Motor Car Company as It Will Look When Completed.

The rapid growth of the Overland company and the plans which Mr. Willys has formulated for its future development are said to have brought about the change. The personnel of the Fisk Rubber company and the Willys-Overland company will remain unchanged.

PACKARD BUYS BURD RINGS.

The Burd High Compression Ring Company, Rockford, Ill., has secured a contract from the Packard Motor Car Company to supply the entire 1916 requirements of the company with its patented Burd high-compression rings for cylinder pistons. This is one of the several orders which have caused the Burd company to double

its floor space and facilities twice within the last six months, some of the other orders being from the Bull Tractor Company, Minneapolis; the Minneapolis Steel and Machine Company, the Toro Motor Company, St. Paul, and in addition, to supply the increasing demand from the 13 branch offices and the trade.

JOHNSTON HEADS ASSOCIATION.

At a meeting of the directors of the Automobile Trade Association of New York State, held May 19, in New York City, R. H. Johnston of the New York Automobile Dealers' Association was re-elected president, Chauncey D. Hakes of the Albany Automobile Dealers' Association was re-elected vice president; Ralph E. Brown of the



R. H. Johnston, President of Automobile Trade Association.

Buffalo Automobile Dealers' Association was re-elected treasurer and Charles A. Stewart of the New York association was re-elected secretary and general manager. The election was by unanimous vote and the directors passed a resolution expressing appreciation of

the effective work of the officers during the past year.

MONARCH MOTOR REORGANIZED.

New capital of large proportions has been placed behind the Monarch Motor Car Company, Detroit, Mich., of which R. C. Hupp is president, and the organization completely reconstructed. Capital stock of \$400,000 is shown in the incorporation papers filed in Delaware. The most recent appointee to the company is T. C. P. Forbes, who is well known in the industry as a lieutenant of Ray Owen in marketing the Reo and later in connection with the Overland. The other officers and managers include A. A. Lehr, director of purchases; Walter R. Bamford, production

manager; M. L. Shank, assistant secretary and treasurer, and J. L. Bell, service manager.

The company has been working on an eight-cylinder model for several months and announces that it is ready for the trade. For the 1916 season the company is planning to make 3000 to 5000 eight-cylinder cars, beginning with 125 for June delivery.

STARTING SYSTEM MAKER EXPANDS.

The Leece-Neville Company, Cleveland, O., one of the pioneers in the electric starting and lighting system industry, has been compelled by its expansion of business to seek larger quarters, and has purchased a two and three-story factory in Cleveland, and it will gradually move its different departments and add new machinery to its equipment without interruption to the production of the company. The new building has a frontage of 150 feet, is 312 feet deep, is located on the main line of Pennsylvania railroad and has switching service to all other railroad systems entering Cleveland.

NEW TRUCK MAKER.

A new builder of commercial trucks has joined the industrial centre of Detroit. It is the Falcon Motor Truck Company, which was recently incorporated by A. B. Mallow of Detroit, F. B. Houston of South Charleston, O., and A. B. Hazard, an engineer of Detroit, and designer of the truck to be manufactured. This vehicle is to be of the light delivery type of 1000 to 1200 pounds capacity, and it will list at \$750. Manufacture is stated to have already begun in the plant leased at 811 West Jefferson avenue, Detroit.

RICHARDSON GOES TO ARGENTINE.

The Studebaker Corporation, Detroit, Mich., in seeking to develop its rapidly increasing business in South American countries, has sent D. B. Richardson to Buenos Aires to assist the Studebaker organization in the Argentine. Mr. Richardson has had wide experience in the southern continent, being well known in Central American republics, as well as in Mexico, where he served the corporation in very responsible positions.

The Willys-Overland Company, Toledo, O., will produce 600 Overland cars a day during its next fiscal year, according to John N. Willys, president of the company.

MAXWELL MOTORS DIVIDEND.

The Maxwell Motors Company, Inc., Detroit, Mich., has declared an initial dividend of $1\frac{3}{4}$ per cent. on the first preferred stock and an additional dividend of $\frac{3}{4}$ of one per cent. on account of accumulated back dividends on the first preferred. Dividends are payable July 1 to stock of record June 10. The company is stated to have outstanding \$12,279,332 first preferred seven per cent. cumulative stock, \$10,127,467 six per cent. non-cumulative second preferred stock and \$12,778,057 common stock. The first preferred stock has been cumulative since Jan. 1, 1913, at the seven per cent. rate.

By action of the directors, the first preferred stock is placed on its regular seven per cent. basis and the payment of the accrued dividends is begun by the declaration of an additional $\frac{3}{4}$ of one per cent.

The indications are that at the end of July 31 next the company will have earned a net balance of about \$3,000,000, which is nearly double that of the 1914 fiscal year.

STUDEBAKER DIVIDENDS.

An initial dividend of $1\frac{1}{4}$ per cent. on common stock has been declared by the Studebaker Corporation, and the stock has been placed on a five per cent. dividend basis. On the preferred stock, a regular quarterly dividend of $1\frac{3}{4}$ per cent. has been declared. Dividends are payable June 1 to stock of record May 20.

The current fiscal year is reported as the most prosperous in the company's history, contracts with the belligerent nations of Europe having amounted to about \$17,000,000. The domestic business has also been large. Sales for the fiscal year 1914 reached the record total of \$43,444,223, and that record is expected to be exceeded this year. Earnings last year on the \$27,931,600 common stock were reported as 14.2 per cent.

GENERAL MOTORS' FINANCES.

The cash situation of the General Motors Company seems not to be effected materially by the steady retirement of its six per cent. notes. It was early in April that the company announced its willingness to redeem the balance of the Oct. 1 notes, about \$5,000,000 of an unexpired balance of \$7,852,000 being thus involved. To date the company has taken up about half of the amount, leaving approximately \$2,500,000 worth of notes in the hands of the public, and yet Gen-

eral Motors has now in its treasury over \$13,000,000 in cash. This balance in cash is equal to nearly \$90 a share for the preferred, leaving the remainder of working capital and plants for the common.

DEEDS FOUNDED THE DELCO.

E. A. Deeds, who surprised the automobile world recently by resigning his position as vice president and general manager of the National Cash Register Company to become general manager of the Dayton Engineering Laboratories, of which he already was president, had from the first been a leading figure in that successful business.

The company, which he now directs, began its business career in a shed on Mr. Deed's property in Dayton, O. About a quarter of a million dollars worth of equipment was built and sold from that building before the electric cranking of automobiles was possible.

For the past three years the company has occupied a splendid concrete building six stories high. It now employs about 1700 men. In anticipation of a large growth for the business the entire city block adjoining the plant was purchased about two years ago and work is now going forward on a new building which will double the capacity of the plant.

Until now the entire management of the company has been in the hands of C. F. Kettering, vice president, while Mr. Deeds gave his attention to the National Cash Register business and acted in an advisory capacity with Delco. The great growth of the business has made it necessary to take part of the burden from Mr. Kettering, who in the future will give his attention more especially to production problems.

Mr. Deeds had been with the National Cash Register Company for 15 years, and during the



E. A. Deeds, Founder of Delco.

last six had been its general manager. The enlarged Delco plant will give employment to about 2400 men.

FORD INCREASES CANADIAN PLANT.

A sale of a real estate parcel in Winnipeg, Canada, recently disclosed that the Ford Motor Company of Canada, Ltd., is contemplating the erection of an assembly plant, four stories in height, the total plant to cost about \$250,000. The plot was sold at approximately \$100,000, according to advices from Winnipeg.

This development is said to be the result of the steady and rapid increase of business in western Canada, which overtaxed the facilities of the Ford plant at Ford, Ontario. The parts will be supplied to Winnipeg from the Ontario plant, and it is stated that the new factory will give employment to between 200 and 300 men.

OVERLAND DEMAND EXCEEDS SUPPLY.

Although the Willys-Overland Company, Toledo, O., is shipping cars at the rate of 2000 a week, a record established in the week ending May 15, the demand is greater than the supply. May 10 was a banner day, for 414 cars were shipped, which was the largest number dispatched from that factory and showed an advance of 25 per cent. over the next highest number. Mr. Willys not only expects to meet the 600 mark set by himself for production, but to exceed that mark when the new buildings being erected are complete. Several Overland officials declare their purpose of occupying portions of the new additions by June 1.

BUICK EARNING BIG PROFITS.

The Buick Motor Company, Flint, Mich., is expected at the close of the current fiscal year to show that it earned nearly 50 per cent. of the total profits of the General Motors Company, the parent concern. Sales of Buick cars to date are larger than for all the 1914 fiscal period, and it is estimated that the total yearly output will approximate 43,000 cars.

MORE PURITAN ACQUISITIONS.

A. O. Dunk, president of the Puritan Machine Company, Detroit, Mich., recently completed the purchase of the entire stock, assets, drawings, charts, etc., of the Crescent Motor Car Company,

Cincinnati, O. Mr. Dunk has also bought up the stock and assets of the Ohio Motor Car Company, Carthage, O., and is having the stock of both companies removed to Detroit, from where parts and accessories for those "orphan" cars will be supplied to customers. The Puritan company has now acquired the assets of 64 defunct companies, the makes of cars of which can be supplied promptly and at exceedingly moderate prices.

LOZIER BRANCHES OPEN.

The new arrangements for Lozier distribution through branches have been completed and in nearly every city the distributing agencies have been taken over either by the company or by men delegated by it to conduct them. In Boston, John J. McCarthy is operating the branch under the name of the Lozier Service Station, 16 Harcourt street. J. H. Horman, a former racing driver, is the manager in New York City. J. R. Dean cares for the Lozier interests in Chicago. In San Francisco branches have been placed under the joint management of G. L. and J. A. McPherson.

BIG YEAR FOR OLDSMOBILE.

The general revival of business is reflected in the increased business of the Olds Motor Works, Lansing, Mich., which is said to have already sold all the cars it can produce in the next month. The demand is especially for roadsters, and practically all dealers are sold out and are offering bonuses to obtain more.

The total amount of business conducted during the past April shows an increase of 82 per cent. over the corresponding month of 1914. E. Ver Linden, factory manager, states that plans are now under way to meet the demand.

COLE SHIPMENTS NEAR 200 MARK.

Within the last month the production of the Cole Motor Car Company, Indianapolis, Ind., has been increasing extraordinarily. During the past week shipments exceeded 150 Cole cars, and every evidence was at hand that during the following week the production would reach the 200 mark. The Cole company began deliveries of the Cole "Eight" some time ago and enthusiastic reports of the new car are being received from purchasers and dealers from all parts of the country.

CAR ACCESSORIES AND EQUIPMENT.

FRIESTEDT RIM CONTRACTERS.

Chicago Company Makes Contracters for Quick and Easy Removal of Tires from Straight Sided Rims.

Warped rims are often caused by forcibly prying off tires. A tire sometimes becomes so firmly fixed and resists removal until it requires twisting and pulling to

move it, which usually pulls the rim out of shape. In replacing the shoe, the flaps often will be twisted out of shape, the result of the forcible removal, and have to be guided onto the rim by a screw driver, or some such instrument. This practise should be discouraged, as the inner tube may become punctured.

The Friestedt Rim Contractor Com-

Contracter Providing Quick and Easy Removal of Tires.

pany, 2934-6-8 W. Lake street, Chicago, Ill., is manufacturing a device for the easy and quick removal of tires from straight sided split rims, which are used on such cars as the Overland, Reo, Hudson, Fiat, Dodge, Peerless, Hupmobile, Stearns and many other makes. The tool does not contact with the tire, but simply grips the edges of the rim with two small hooks and by the use of an attached lever member, raises one end of the rim and overlaps the other. When fully contracted the lever can be locked, thus holding the rim in the desired position. The rim can now be removed and the tire changed. When replacing the rim, simply fit it on the tire and release the lever. This tool is guaranteed not to mar the rim, as the real pressure is applied against the rim lock. The weight of the device is under two pounds and is only 17 inches in length. It is positively rust proof, all parts being sheridized. It is offered to the trade under the name of the Friestedt Rim Contractor and is retailed for \$2. The company announces that it has some interesting proposals to make to dealers regarding agencies. Inquirers should mention the Automobile Journal when writing to the company.

"AIKEN" REVOLVING SEARCHLIGHT.

Boston Firm Manufacturing a Revolving Searchlight Which Is of Great Value for Night Driving.

The Farrington Manufacturing Company, 23 Vale street, Boston, Mass., is marketing a revolving searchlight of unusual interest. This device, which is sold by

the trade name of the "A i k e n," can be clamped on the dashboard or the side of the windshield on practically any make of car. It is

AIKEN REVOLVING SEARCHLIGHT For Automobiles and Motor Boats



*Around a corner
Anywhere
If you want a light
I'll throw it there*

"Aiken" Revolving Searchlight.

operated by a wrist movement of the knob at the end of a 24-inch handle, which also controls the light switch. By the use of this attachment the light can be revolved hori-

zontally or vertically for 360 degrees. Thus it will be seen that the light may be thrown in any desired direction. The company guarantees the accessory and states that it is constructed of finest material. The average individual can adjust this light to the car in very short time. It can be operated by either battery or generator. The lamps are finished in black nickel with white nickel trimmings, and retails for \$10. As this device produces a very powerful light, it can also be used on motor boats.

AIRPLEX TIRE CUSHION.

A Vulcanized Compound Cushion for Insertion in Tires to Lessen Road Shock and Punctures.

A tire cushion composed of a vulcanized compound made by secret formula is being manufactured by the Airplex Inner Tire Company, Springfield, Mo. The purpose of this cushion, designated by the manufacturer as the Airplex Cushion, is not only to minimize the possibility of punctures through protecting the inner tube,



Sectional View of the Airplex Tire Cushion in Position Between Shoe and Tube.

but also to cushion the tire from road shocks.

That the company has full faith in its product is evident from the fact that the cushion is absolutely guaranteed for one year not to allow the inner tube to become punctured, the only proviso being that the tire is not used with air pressure below the minimum specified for the size of tire to which it is applied. A further guarantee is that the cushion will be replaced free of charge within one year from date of purchase should it become damaged in any way by a puncture received in the ordinary course of tire usage.

The cushion is said to be much more resilient than either rubber or air at tire riding pressure, though in its composition neither rubber, glue, glycerine or similar materials are used. To install the cushion, it is only necessary to remove the shoe from the rim and insert it between the casing and tube. A valuable feature is that the cushion can be removed and placed in a new shoe when the old casing wears out. It can be used in conjunction with the ordinary type of tube, but the company is prepared to supply at a moderate price its own special Airplex red tube, which is extraordinarily strong and is designed to go with the cushion. Prices and further information can be obtained from the company by mentioning the Automobile Journal.

CAR ACCESSORIES AND EQUIPMENT.

BRILLIANT BURNER.

A Headlight Attachment That Intensifies the Light for Highway Use and Dims It for City Travel.

Serious accidents are sometimes caused while driving at night along some unfamiliar roadway because the headlights are not powerful enough to safely illuminate the highway. The fact that the driver thoroughly understands the operation of his car does not lessen the danger in the least. Monosmith Brothers, Spencer, O., is manufacturing a burner that is sold to the trade under the name of the Brilliant Burner. The maker claims that this device will afford brilliant lights in the country and dimmed lights in the city. The Brilliant Burner is composed of an acetylene Bunsen jet, which projects against an incandescing button. It will be noted that the same principle is adapted as is employed in the ordinary gas mantle.



The Brilliant Burner.

The device is made in two parts so as to allow the reflector to be cleaned without any obstruction in the lamp, and also to permit the incandescing button to be turned so as to give a brilliant or diffused light as desired. The installation of this device into any gas light is very simple. All that is necessary is to remove the old burner, soap the threads and screw on the new burner. The incandescing button, which is $\frac{3}{4}$ -inch diameter, should be turned with the face towards the reflector, thus giving a very strong light. It is claimed that this burner will give equal satisfaction if the front glass of the lamp is missing. The buttons on this burner are renewable and with average usage will last for a whole season. These burners are sold in sets of two complete burners and one extra button, and retail for \$3. Extra buttons will be supplied at an additional charge of 70 cents a pair.

RELIABLE TUBE REPAIRER.

A Metal Tube Repairer Which Can Be Used Any Number of Times.

The Splitter Puncture Plug Company, Inc., 1790 Broadway, New York City, is the manufacturer of a tire repair



How the Splitter Tire Plugs Are Utilized.

plug that is made entirely of metal and can be used practically any number of times. The application is simple. It is necessary only to force the disc, containing the pro-

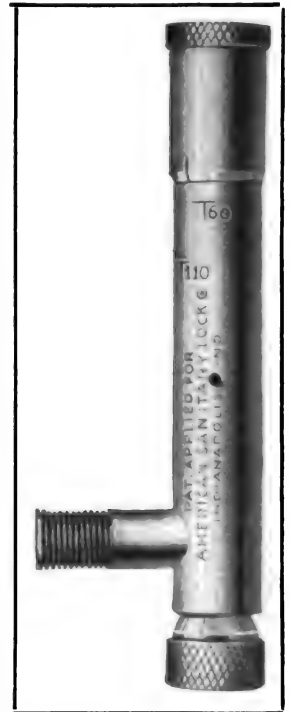
jecting threaded stud through the hole until it rests on the under side. Then the cap is slipped over the stud and locked in position by a small lock nut and key. This will bring the two metal plates together so that no air can possibly escape. These plugs provide quick and permanent tire repair under any condition. It is stated that this device will repair any hole smaller than itself and cannot chafe or cut the tube or fabric. It is also claimed by the maker that they automatically vulcanize themselves to the tube, thereby further insuring air tightness. These plugs are made in three-quarter and one-inch sizes and are put up in sets of four, including a key, selling for 75 cents and \$1, according to size.

"POP-OFF" TIRE GAUGE.

A Low Priced Accessory That Absolutely Guarantees That Tires Will Not Be Over-Inflated.

In the educational campaign being promulgated by tire builders and others one of the cardinal points brought out is that to over-inflate a tire is as injurious, if not worse, as running a car on tires which are not inflated up to the standard pressure. Several accessory manufacturers have produced devices designed to take the responsibility from the motorist of keeping the inflation pressure at the proper point.

One of these manufacturers is the American Sanitary Lock Company, 1072-1080 South East street, Indianapolis, Ind., which is producing an adjustable tire gauge, illustrated herewith, that allows pneumatic tires to be inflated only to a predetermined pressure, the operation being mechanical, automatic and certain. The threaded projection shown in the illustration is the member to which the air line is connected, while at the base of the gauge is the knurled knob by which the device is attached to the tire valve. The knob at the top is to regulate the mechanism to the pressure standard for the size of tire to be inflated. In operation, when the predetermined pressure has been reached, the air passage in the gauge leading into the tire is automatically closed, and the excess air directed through a valve in the side of the gauge into the atmosphere. The gauge can be adjusted from 60 to 110 pounds pressure, and is sold by the company, under the name of the "Pop-Off" Gauge, at \$1.



"Pop-Off" Tire Inflation Gauge.

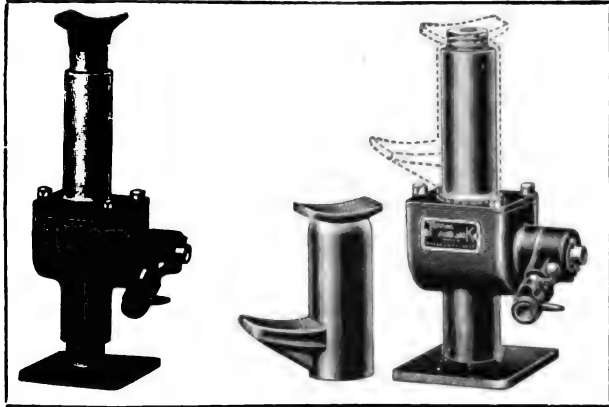
NEW TYPE OF AUTO JACK.

A Strong Automobile Screw Jack Which Has Involved the Principles of the Locomotive Lifting Device.

Topping Brothers, 122 Chambers street, New York City, is manufacturing a strong automobile screw jack, built on the same principle as their locomotive jacks. The Topping jack is provided with a double-ended screw which produces a rise at both ends, thus making the operation twice as fast as conducted by the ordinary jack. The right hand thread on the upper part of the

CAR ACCESSORIES AND EQUIPMENT.

screw engages with the travelling lifting head, while the left hand thread on the opposite end engages with the standard. The head and standard are both enclosed within a case or shell, out of which they emerge as the device is operated. The company makes two types



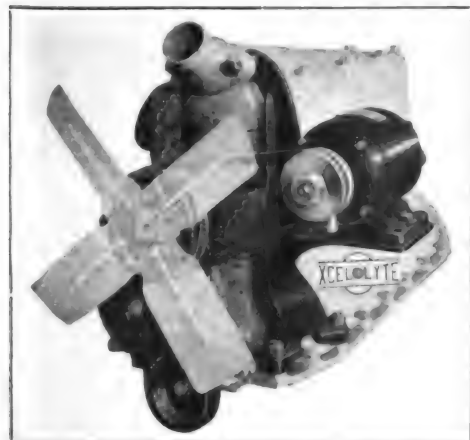
Topping Jacks Showing Regular Type with Lifting Head Only, and the Auxiliary Member with Side Spur for Lifting Low Set Axles.

of jacks, one for pleasure cars and another for trucks. The principle of both is the same, the only difference being in the weight of the parts. The illustration shows the jack designed for a head lift only, and whose swivel top is removable. The company will furnish another member, at an additional charge of 50 cents, which is fitted with a side spur for the raising of low set axles, as is noted in the illustration. The pleasure car jack, which is 11¼ inches high when fully compressed and has a lifting capacity of seven inches, is sold for \$6.50. The truck jack, which is 13¼ inches high when closed and also has a rise of seven inches, can be bought for \$8.50.

XCELOLYTE LIGHTING SYSTEM.

Iowa Firm Manufacturing a Complete Lighting System for Ford Cars That Can Be Utilized for Other Purposes.

The Xcel-o-lyte Company, Newton, Ia., is marketing a complete dynamo battery lighting system for Ford cars, which is a complete electrical plant and practically



Xcelolyte Lighting System, Showing It Assembled on Ford Motor.

of unlimited scope. The current is produced by a high-grade ball-bearing generator, which can be attached to the side of the motor by means of a bracket. This generator is driven by a belt from a split pulley attached to the fan shaft, and the current is sent through an

cut-out, which breaks the circuit when the engine is not running and prevents the discharge of the battery back through the generator. From the cut-out the current is utilized for lighting purposes, blowing an electric horn, igniting the gas charges in the cylinders, or any other purpose to which electricity may be applied. It is claimed that all of the above operations may be simultaneous and not draw any power from the storage battery if the motor is running at 10 miles an hour.

The current not consumed by the lighting, etc., is carried to the storage battery, thus keeping that component up to its greatest efficiency at all times. The cut-out on this system is placed on a line between the storage battery and the generator, and automatically closes the circuit when the engine is running and automatically breaks it when it stops. It is neatly designed and adds to the appearance of the motor. The generator, which weighs about 10 pounds, is finished in black enamel. This member is capable of producing six volts at a normal speed of 1800 revolutions per minute.

The company is offering a complete lighting system, including generator, storage battery, steel battery box, two double-bulb, 10-inch black and nickel headlights, tail light, dash light, ammeter reader, automatic cut-out and all fittings, wiring, switch, etc., that go with a com-

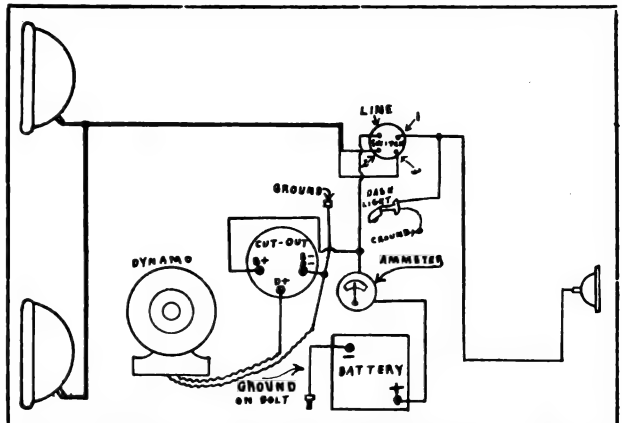


Diagram Showing Wiring and Usual Location of Components of Xcelolyte Lighting System.

plete system, at a very reasonable price. This system is sold with the ironclad guarantee that it will give satisfaction. The company will furnish further details and prices to anyone who writes and mentions the Automobile Journal.

HARTFORD FUEL ECONOMIZER.

New Jersey Concern Makes Device for Economical Use of Fuel When Its Quality Is Low.

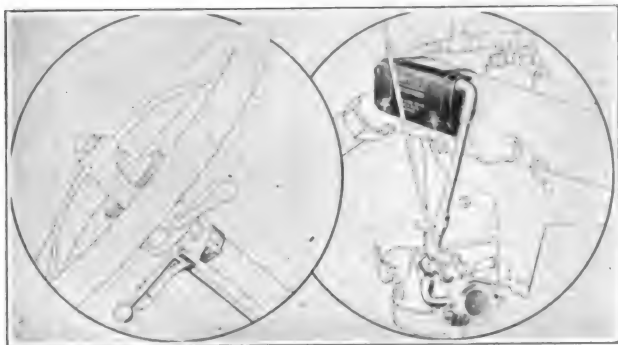
In placing the Hartford Economizer on the market, the Hartford Suspension Company, No. 147 Morgan street, Jersey City, N. J., also maker of the Hartford Shock Absorber, states that when gasoline is scarce its quality frequently suffers, kerosene sometimes being mixed with it. Thus, the company states, the mixture shows a test of 60 or 65, instead of the standard 76, and therefore carburetors as a rule are unable to handle the mixture economically; ultimately carbon deposit forms in the cylinders and the engine becomes overheated.

The Hartford Economizer is designed to minimize these effects, and is said to save fuel for the Ford car owners. When installed the device is located near the carburetor, its control being on the steering wheel, as is noted in the accompanying illustration. The chief components of the device are a heating member, clamped to the exhaust, and a hollow flange, inserted between the

CAR ACCESSORIES AND EQUIPMENT.

carburetor and the intake. These two members are joined by a brass pipe.

In operation the air passes through the cored passage



Location of Hartford Economizer and Its Control Lever on Steering Column.

of the heater, travelling a distance of about two feet in close contact with the hot exhaust manifold, and is consequently heated before reaching the intake. The air is screened as it passes through the small flange, which assists in breaking up any suspended particles of gasoline. The position of the flange is considered extremely important, it preventing the air from passing over the spray nozzle of the carburetor, and therefore does not carry extra gasoline with it. It simply adds extra air to the charge and improves the quality of the mixture in three ways; first, by breaking up the gasoline particles through the screen; second, by making the mixture more homogeneous through the increased volume of air; third, by making vaporization complete by heating the air against the exhaust pipe.

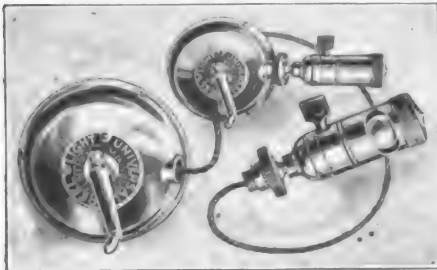
Thorough tests have proven that the device is efficient. The manufacturer states that by means of the economizer the speed of a Ford car can be varied from 10 to 25 miles an hour simply by allowing air to enter through the device, without opening the throttle of the car a particle, which of course saves fuel.

When properly installed the Hartford Economizer is guaranteed to show a 35 per cent. increase in mileage to the gallon. Further particulars can be obtained by writing to the company and by mentioning this magazine.

UNIVERSAL REEL-LIGHT.

An Accessory That Is a Valuable Adjunct to Any Car's Equipment.

Trouble lights are valuable adjuncts to the car's equipment. The scope of such a light is unlimited. Cummings Brothers, Flint, Mich., are manufacturing a portable trouble light which they designate by the name of the Universal Reel-Light. It can be installed on the control board like all other dash instruments, and connected to the regular lighting system or to dry cells. This light will act in a dual capacity, for when it is not being employed as a trouble



The Universal Reel-Light.

light it can be utilized for illuminating the dash instruments.

The lights are made in two types, the manufacturer listing them as A and B. Type "A" is especially designed for old style cars not equipped with the cowl dash and is also used extensively on Ford cars. This type has a reflector for the lamp and is retailed for \$3.75. Type "B" is designed for cars with a flush type dash. It is equipped with a bonnet reflector which protects the bulb from breakage. Both of these types can be so adjusted by means of a ball and socket joint as to throw the light in any desired direction. The retail price of type "B" is \$4. The company has an interesting proposition to offer to dealers and jobbers.

BOBRA QUICK DETACHABLE PLUGS.

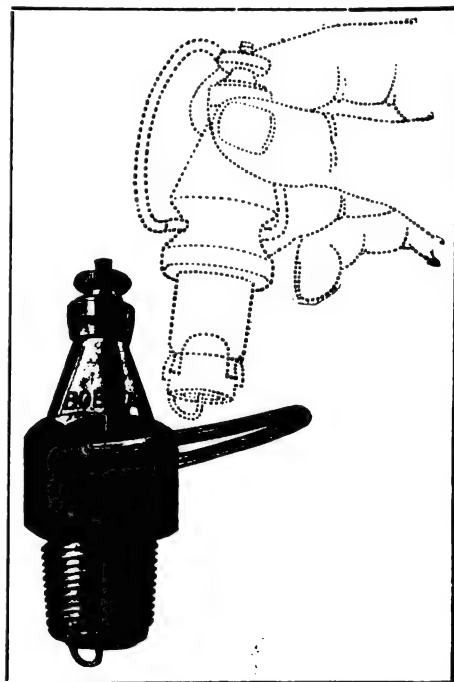
Dayton Manufacturer Adds Quick Detachable Principles to the Spark Plug with Excellent Results.

The Bobra Spark Plug Company, Inc., Reibold building, Dayton, O., is the manufacturer of the Bobra Quick Detachable Spark Plug, the central insulator of which

contains all the electrodes and can be removed as a unit without the application of a wrench or other tool. This is accomplished by the raising of a V shaped wire, which is anchored in the insulator and snapped under the corners of the hexagon shaped surface on the plug shell.

The quick removal of this central core affords an opportunity either to inspect and clean the member, adjust the electrodes,

or prime the engine. As stated above the insulator carries all the electrodes and the sparking points may be adjusted while the insulator is detached from the bottom shell. When the plug shell is once screwed into the cylinder, it need never be removed, thus eliminating the danger of wearing the threads and allowing the compression to leak. Bobra plugs are built throughout for service, they being made of only the best of materials. They have been subjected to many severe tests and are sold with the guarantee to give reasonable service and to be absolutely compression tight. These plugs are adaptable to all kinds of work and are made in three standard sizes, A, L, A. M.; 1/4-inch standard and metric threads, and can be bought from dealers or direct from the factory for \$1 each. The company will supply inquirers who mention this publication when writing with full information.



Bobra Quick Detachable Spark Plug.

DIXIE HIGHWAY STARTS STRONG.

The project for the Dixie highway, a great national road from Chicago to Miami, Fla., received promise of the most substantial support at an organization meeting convened at Chattanooga, Tenn. Four governors were present in person and 6000 enthusiastic and influential automobilists took part in the proceedings.

The Dixie Highway Association was formally organized and 20 men each pledged \$1000 a year for five years to support the organization. The governors who were present were Ralston of Indiana, Slaton of Georgia, McCreary of Kentucky and Rye of Tennessee. These governors met and passed a resolution heartily indorsing the movement. Large delegations came, headed by bands, from Cincinnati, Louisville, Nashville, Atlanta, Savannah, Rome, Ga., and Birmingham.

It was decided that the route should be chosen by a committee made up of two men appointed by each governor of a state through which the road will pass—Illinois, Indiana, Ohio, Tennessee, Kentucky, Georgia and Florida. In addition to these 14 representatives the seven directors of the Dixie highway will have a place on the committee.

After the meeting the governors named the following as their representatives on the committee: Indiana, Thomas Taggart and Carl G. Fisher; Ohio, Harry L. Gordon and George Harris; Kentucky, Harry B. Hanger and Claude Mercer; Tennessee, Col. A. M. Shook and M. M. Allison; Georgia, W. T. Anderson and Clark Howell.

It is expected that the association will increase the number of men who will provide \$1000 a year each to 50, which will supply \$250,000 for the work of the organization during the five-year period.

REFORMATORY BOYS BUILD ROADS.

Boys of the Connecticut reformatory are to build a new road from the institution to Milldale, and perhaps continue it to the present macadam in Cheshire. They will receive 50 cents a day for their work. The money will be either sent to their families or held for the boys until their release.

The 50 boys who are to do the work will be selected by Superintendent Garvin and the Mutual Welfare League, which is an organization of inmates of the institution. This is being fostered under the influence of E. Kent Hubbard, a member of the board, who is following in the

footsteps of Thomas Mott Osborne, the New York state penologist.

Full responsibility for the roads will be retained by the Connecticut highways department, which will provide all materials and tools. The boys will not wear stripes or distinctive uniforms when at work. They will ride to work every morning on the trolley cars like other workmen.

Road work for prisoners is a long step forward in Connecticut, where most of the convicts are still employed under the contract system.

FARMERS TO FEED TOURISTS.

A proposal for a tourists' co-operative bureau, which will furnish information regarding farmers along the main travelled highways of the country who are willing to feed and house tourists, has been suggested by N. S. Wood, a St. Louis real estate dealer, who has just spent several months in touring.

This suggestion is meeting with much support. The idea is to have the farmers who enter the agreement set a price for supper, lodging and breakfast—probably \$1 for each person. Each farmer who enters the arrangement will display a signal close to the road showing that such accommodations are available.

BIG DEMAND FOR ROUTE GUIDES.

The American Automobile Association reports that an unusual demand for maps and route books covering all parts of the country has developed. The A. A. A. clearing house for information has adopted a plan whereby its maps are corrected every year, showing new construction and any change that may have affected touring conditions. Tourists may receive suggestions regarding tours contemplated by communicating with the headquarters of the association, No. 437 Fifth avenue, New York City.

C. T. Silver, dealer in Overland motor cars in New York City, has erected an immense sign-board, as an advertisement of Overland cars, at the Polo grounds, where the New York National League teams play. To the first player that hits the board with a batted ball he offers a prize of a new Overland car.

A statistician has estimated that more than 1,000,000,000 gallons of gasoline will be consumed in motor vehicles in the United States this year.

GAS-ELECTRIC 'BUSSES FOR URBAN USE.

THE new gas-electric chassis of the Blair Motor Truck Company, Newark, O., have been fitted with double-decked 'bus bodies, and are



View of Two Units of Transmission System, Motor and Generator, and the Double Frame of Blair Gas-Electric 'Bus.

being put through exhaustive tests preparatory to entering the 'bus field on a large scale. One of these 'busses has been running in Philadelphia since last October. Another 'bus has been making cross-country runs from the Newark factory to Columbus, a distance of 36 miles.

The end sought by the use of the gas-electric design is to obtain all the advantages of easy starting and perfect speed control, which is usual with the storage battery type of electric truck, but to avoid the large weight and consequent cost of operation and upkeep which heavy storage batteries sometimes involve. It saves also the constant shifting of gears which is necessary in 'bus work and which wears out transmissions of gasoline trucks very rapidly.

Previous to designing this gas-electric type, the Blair company had produced a gasoline vehicle which was distinguished by a special patented sub-frame hinged to the main frame at the front and supported at the rear by trunnions concentric with the driving worm housing at the rear axle. This made universal joints unnecessary and relieved the operating parts of all distortion caused by the weaving of the frame on uneven road surfaces.

This same construction has been retained in the gas-electric chassis. An electric generator is placed on the sub-frame and connected directly to the gasoline engine. On the sub-frame further back is an electric motor, which drives the truck through a worm and gear reduction and is coupled directly to the worm shaft. The gasoline motor is also mounted on the sub-frame, so that the entire power plant is one unit mounted on a common base.

This base or plate formed by the sub-frame is suspended at three points. The two hinges at the forward end are steel castings, with heavy hardened and ground hinge pins. The main frame of heavy channel section carries all the weight of the body and the load.

As the testing of the gas-electric chassis is still under way, and its exact make-up has not yet been definitely determined, specifications for the truck have not been made public. Outside of the power plant, however, it is said to be very similar to that of the gasoline trucks which were formerly produced by the company.

In its previous models, a full floating worm drive rear axle was used and in front a drop forged I beam. Front wheels were equipped with 36 by five-inch solid tires and rear wheels with 36 by four-inch solid duals. All brakes were of the contracting type.



Type of Gas-Electric 'Bus Designed for Passenger Transportation in Large Cities.

The company proposes to devote particular attention to the 'bus market, and lines are projected for nearly every city of prominence.

PREMIER ADDS NEW BODIES.

The Premier Motor Manufacturing Company, Indianapolis, Ind., has added three new bodies to the line which it supplies with its 6-50 chassis. They are a three-passenger Cloverleaf roadster, a speedster and a three-passenger roadster and coupe combined. The roadster has an aisle way between the two front seats to the third seat. This is of conventional type and not a "bucket" seat. The speedster is long and low, with the driver's seat set ahead of the passenger seat.

INSURANCE RATES GO UP.

Insurance companies have announced a 25 per cent. increase in automobile liability insurance rates for Rhode Island. This affects about 15,000 owners of motor cars in the state. Last year they paid premiums of about \$165,680, and an increase of 25 per cent. will mean payment of an additional \$41,420. The number of cars in operation has been increasing very rapidly and this has increased, of course, the number of accidents. Previous rates have been based on unsatisfactory statistics and many of the companies found they were paying out more for losses than they were receiving in premiums.

The cost of securing this class of business is said by insurance men to be high and they feel that they are not making a satisfactory return unless their losses aggregate not more than 50 per cent. of the premiums paid in. The new rates are expected to establish about that proportion.

Liability insurance rates for automobiles vary in different sections, according to the nature of the country, as do rates for other sorts of insurance. In the more sparsely settled states of northern New England, where traffic is not very dense, and accidents less likely, rates are comparatively low.

INTERSTATE BUILDS ROADSTER.

A roadster model, priced at \$-000, has been added to the line of the Inter-State Motor Com-

pany, Muncie, Ind. The roadster is mounted on the standard Inter-State chassis and has an exceptionally large compartment at the rear in which two tires mounted on rims can be carried. Access to this compartment is through a door which when locked forms a cover. There is a baggage compartment behind the seat large enough for a small steamer trunk. This is entered through a door on top of the seat back. It may be opened when the hood is either up or down.

SCRIPPS-BOOTH WINS BEAUTY PRIZE.

The opening of the baseball season in Chicago was made notable by a monster parade through the city streets, and a big feature of the



The Scripps-Booth That Won First Position in Chicago Baseball Parade.

parade was the large number of decorated automobiles. Among the 218 cars that competed for the honor of leading the "march," the Scripps-Booth car, illustrated herewith, won that position because of its splendid decorations and general beauty of lines. The line of march was through the Loop district to the ball grounds.

GOODYEAR PRICE POSTERS.

Large posters bearing the net prices of every size and type of Goodyear tires have been furnished to dealers everywhere, so that the net price can be seen at a glance by any customer entering the store. This was adopted after the third price reduction in three years went into effect in February.

PRACTICAL MOTOR CAR REPAIRS.

A CAUSE of motor knock on the earlier models is found at the camshaft, usually because the keys that fasten the separate cams to the

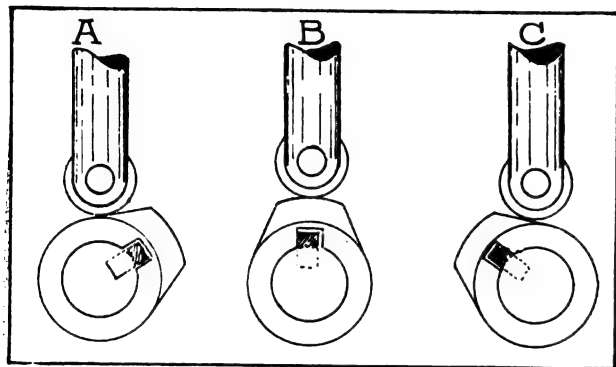


Fig. 40—Action of Separate Cam and Wear Caused by Resistance on Locking Keys.

shaft are worn. Fig. 40 illustrates the action of the separate cam. The valves are ordinarily kept seated by a strong spring, and, as the cam starts to lift the valves, as in B, the resistance of the spring is sufficient to bring the side of the key slot into forcible contact with the side of the key until the cam fully lifts the plunger as shown in Fig. 40 C. After passing the central point, as in C, the force of the spring tends to force the cam ahead of the shaft, with the result that the opposite side of the slot forcibly contacts with the key, which position it retains until again brought into position. At high throttle especially will be heard the knocking caused by loose cams.

TO REMOVE CARBON FROM PLUGS.

A method of removing carbon deposits from spark plugs, which is claimed to be far superior to scraping, is to make a solution consisting of one teaspoon of granulated lye to one quart of water. Using a porcelain or iron kettle as a retainer, the plugs should be dipped in this liquid, which should be placed over a slow fire and allowed to boil for about 15 minutes. The plugs should be rinsed thoroughly in clean water and allowed to dry. Never replace the plugs in the cylinder when wet or damp.

HINTS ON THREAD CUTTING.

In automobile repair work it is frequently necessary to cut left hand threads on bolts and studs at a time when a left hand die is not avail-

able. Fig. 41 illustrates a simple method of cutting a left hand thread on a bolt by means of a right hand tap. Two holes are drilled in a piece of hard wood in such a manner that they cut into each other, the size of the hole of course being equal to the diameter of the piece to be threaded. The tap is screwed into one hole and securely held, while the joining hole serves as a guide for the bolt, causing it to bear against the outside cutting edge of the tap. A left hand thread can now be cut by attaching an ordinary lathe dog to the bolt and then turning it in a left hand direction.

HOW TO MAKE TIRES LAST LONGER.

A general experience is that the largest item of motor vehicle operating expense is the cost of tires. This statement may be applied without regard to the type and size of the machine, and while it may be that tire expense will vary with machines, there can be no question that the fact stated is absolutely true. Every motorist knows the construction of a tire. Several layers of fabric form the main part of the tire, which is covered on the outside by a thickness of rubber. With use this rubber should wear at the tread and if fully inflated one will seldom experience the common troubles, such as rim cuts, broken beads, etc.

Statement has been made how the tire should wear, but it will be well to state how many tires actually do wear. The tread is often cut or chipped by sharp stones, glass, curbstones, ruts, etc., and in time water or sand will work into the cuts and then ground into the fabric. This will re-

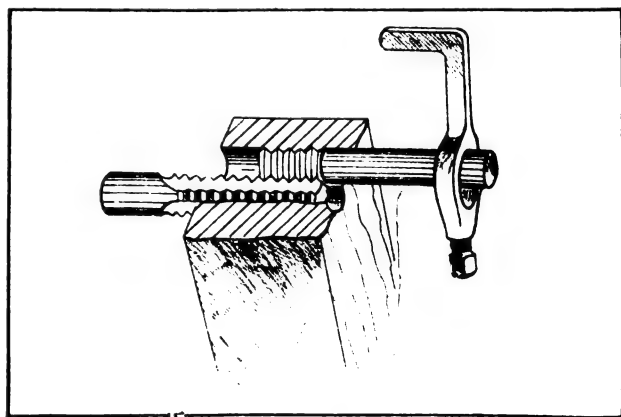


Fig. 41—Home Made Device for Cutting Left Hand Thread with a Right Hand Tap.

sult in sand pockets, which later develop into blow outs, which ruin the casings and tubes. Each blowout causes loss of time as well as ex-

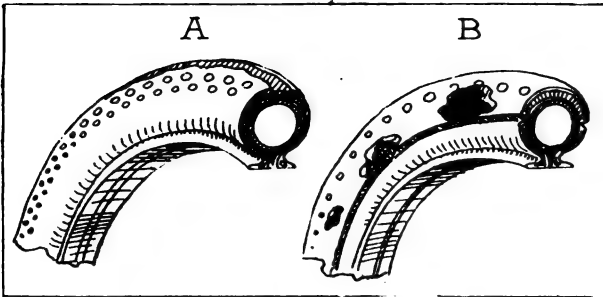


Fig. 42—A Illustrates the Way a Tire Should Wear—B Illustrates Usual Wear Caused by Contact with Curbs, Stones, Etc.

pense, especially if the tire is on a commercial vehicle. With a good vulcanizer one can permanently repair casing cuts without removing the tires from the wheels. First the cuts should be thoroughly cleaned with gasoline and then filled with crude Para rubber. The vulcanizer should then be strapped to the tire above the cut and the heat applied. Heat can be caused by steam, gasoline or electricity. Tubes can be mended in much the same manner. When the tires are properly cared for they will give double the mileage and much time and expense will be saved.

SPARK PLUG GROUNDER.

The locating of a misfiring cylinder is often a difficult operation, especially if the motor is not equipped with relief pet cocks. In the absence of these it is a somewhat lengthy process to remove all the plugs to see that a spark is taking place in each one, and, incidentally, if the wires are disconnected from the plug when the motor is in operation, one is liable to receive a very disagreeable shock. The tool shown in Fig. 43 is a simple fitting. It is made of two pieces of

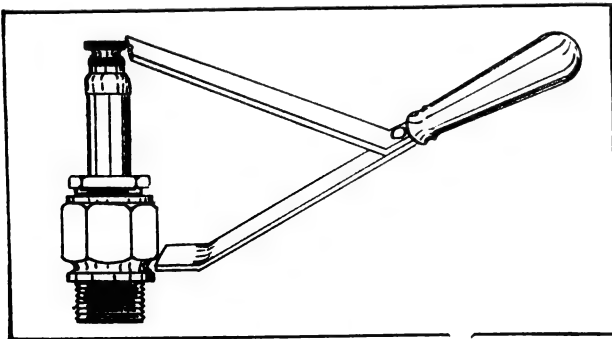


Fig. 43—Representing a Simply Made Tool for Grounding Spark Plugs to Locate Misfiring Cylinders.

sheet brass, riveted together as illustrated. A wooden handle, which is a non-conductor of electricity, is attached to the end. The tool may be used for entirely short-circuiting the plugs, or it may be employed to determine the length of the spark when the engine is running, which is accomplished by placing the top section of the tool on the plug electrode and holding the lower portion a slight distance away from the base of the plug.

WATER PUMP TROUBLES.

It is advisable to thoroughly examine the water pump after a season's use, to remove any rust or sediment that may have gathered to forestall any of the following trouble to which most centrifugal and gear pumps are liable.

When the paddle wheel in the centrifugal pump becomes worn at the sides so that it does not fit the case snugly, as is shown in Fig. 44 A, the circulation will be retarded and the full volume of water will not be forced throughout the

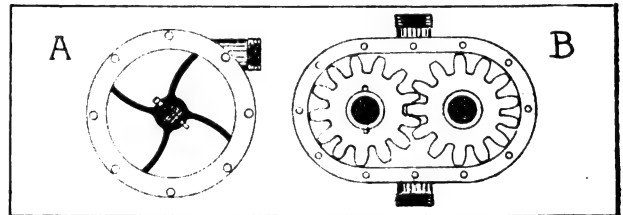


Fig. 44—Illustration of the Operating Principles of Centrifugal and Gear Water Pumps.

system. In that case it is advisable to obtain a new wheel, which sells at a comparatively low cost and is easily secured if the car is of standard make. One frequent trouble if the pump is neglected, is that the taper pin, which generally fastens the wheel to the shaft, becomes rusted and is sheared off, with the result that the wheel becomes loose and impedes the circulation. A gear pump is also subject to the same general conditions. It is essential that the gears are in close contact with the sides of the case in order to obtain an efficient water circulation.

VALUE OF KEROSENE.

Most modern car engines are fitted with pet-cocks in the cylinder heads for the injection of gasoline or kerosene into the cylinders, but there are earlier types of cars which are not so equipped and liquid cannot be injected into the cylinders until the spark plugs are removed. When a car is in continuous service the engine

is generally very free and it can be easily turned over, but if a car is idle for a few days it will become stiff and often difficult to crank. This is

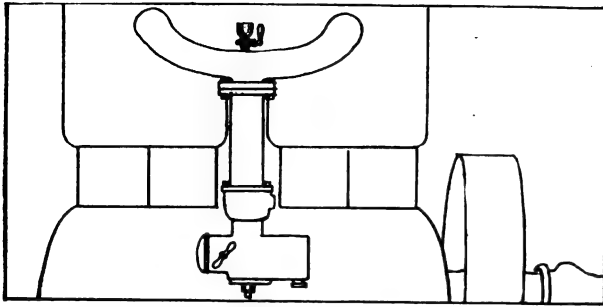


Fig. 45—Sketch Showing Location of Auxiliary Pet Cock on Intake Manifold for Injecting Kerosene to Clean Cylinders.

the result of oil thickening around the piston rings, creating a resistance on the cylinder walls.

Starting the motor will be a considerable task, as the starting handle cannot be turned fast enough to develop a sufficient fuel suction at the carburetor. The ordinary method of injecting kerosene into the cylinders through the relief petcocks is generally considered efficient, but the kerosene must be injected when the motor is idle, as the exhaust and compression strokes of the pistons would force the oil out if the petcocks were open. Tests have demonstrated that the motor will give better satisfaction if the rings and cylinder walls are cleaned after each day's run, which can best be done by injecting the kerosene while the motor is in motion.

A simple and inexpensive fitting to inject the oil can be made by drilling and tapping a hole in the intake manifold at some point near the cylinders, into which is screwed a small petcock. When the petcock is opened and the kerosene injected, the piston will draw in the liquid. When the desired quantity has been supplied the petcock can be closed and the motor run at high throttle for a few minutes, until the kerosene has been fully discharged from the cylinders. This condition can be easily ascertained, as the muffler will emit black smoke so long as there is kerosene in the motor. This treatment will clear away all lubricating and carbon oil from around the rings, and should the motor stand for a week or more it will be as free and easy to turn over as when it was topped. See Fig. 45.

RENEWING FELT WASHERS.

When grease works through an axle housing from the differential gears and is distributed on the brake drums and wheels, the thick felt wash-

ers placed on the axle driving shafts back of the roller bearings have so deteriorated they no longer serve a useful purpose. Many times they will harden through wear, in which event they may be softened by soaking in gasoline, but the best judgment is to replace them with new. Such washers are easily made and are very inexpensive. They can be cut from a felt collar pad, such as can be found in any harness shop if a supply cannot be otherwise obtained.

OVERCOMING RATTLING DOORS.

A frequent complaint among motorists is that the body doors sometimes begin to rattle after the car has been in service for a length of time. An effective and economical remedy for this trouble is illustrated in Fig. 46. Attach a thin brass or fibre plate or strip, only slightly thicker than the play of the door, to the door post. If the play is at either the top or bottom, another plate should be fitted about an inch above the lower end of the door jamb. Of course the most satisfactory course is to have the doors refitted, but as this is a comparatively costly operation, the above suggestion may meet the needs of owners.

LOCATING CARBURETOR TROUBLES.

Trouble caused by poor carburetion usually includes overheating the engine from too rich a mixture and misfiring or "skipping" because of too rare a fuel, both of which will cause loss of power. In determining mixture troubles it is advisable to first observe the exhaust. If the engine exhausts a dense, black smoke that has a stifling odor, this is a sure sign that the mixture is too rich; that it contains too much gasoline for the volume of air. If the engine skips or "pops," the cause is too much air for the volume of gasoline. At this season of the year the carburetor may be troublesome on account of a

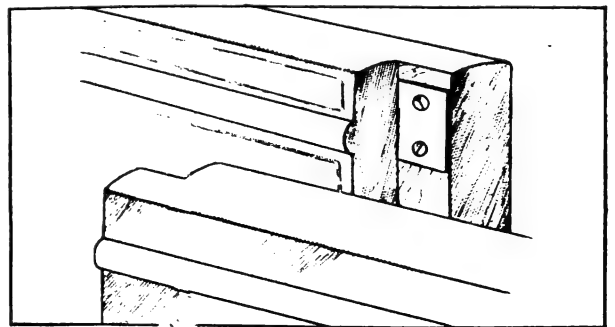


Fig. 46—An Effective and Economical Means of Preventing Loose Doors from Rattling.

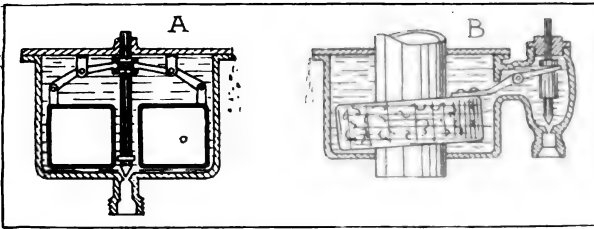


Fig. 47—Showing Defective Metal Float (A) and Defective Cork Float (B) in Carburetor.

too rich mixture. In winter the fuel gas must contain a fair volume of gasoline, because the gasoline does not vaporize readily, but when the atmosphere is warm the ratio of gasoline to air can be reduced, as it is more quickly carburetted.

The first point that should receive attention is the pipe line which leads from the supply tank to the carburetor. If the supply is carried by gravity the flow may be obstructed by dirt or foreign matter, which may settle in the pipe or accumulate on the tank filter. Failure to maintain a proper level of fuel in the float chamber will necessarily cause the level to be too low in the mixing chamber jet, and consequently the mixture will be too thin. If the gasoline overflows the jet the mixture will be too rich. Overflow, or flooding, may be caused by particles of dirt getting between the float controlled valve and its seat, either constricting the opening and preventing the proper flow of fuel or causing the valve to remain open and allowing too much gasoline to flow through.

Another common defect is the failure of the float. Floats are of two forms, cork and metal. The cork float may absorb sufficient gasoline so as to lose its buoyancy, at which point it will drop, keeping the needle valve open and causing the carburetor to flood. A metal float is liable to fill with gasoline through a minute leak and become too heavy. When either of these conditions are found the cork float should be treated with shellac, while the metal float should be soldered, taking care not to overbalance it. If the float is

in good condition and flooding is still evidenced, it will be well to examine the shut off needle and see if there is a shoulder formed on the valve, which prevents it from shutting off the gasoline when the proper level has been reached, Fig. 47.

EMERGENCY PIPE JOINT.

The vibration of the engine or a sudden shock received from a rut frequently will break the water union between the cylinder and the water pipe. If no tubing is at hand, a temporary repair that will enable the motorist to reach a repair shop can be made from the horn bulb. The ball end of the bulb can be cut off, leaving only the funnel shaped portion.

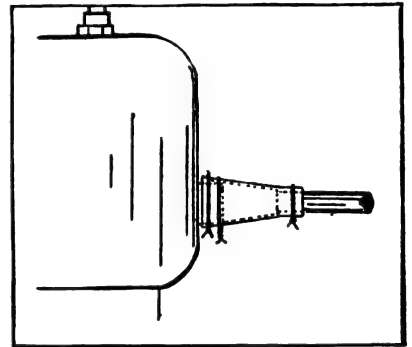


Fig. 48—Temporary Repair of Broken Union Between Cylinder and Water Pipe.

Usually it will be found that the small end will snugly fit the water pipe, while the wide end can be butted to the boss on the cylinder. A water tight joint can then be effected by binding both ends with soft wire. The repair is illustrated in Fig. 49.

GROOVED PULLEY BELTS.

A very satisfactory belt for use on a grooved pulley can be made from twisted raw hide, but its ultimate success depends upon the method of fitting it and the care in making. The important point is the method of joining the two ends. The conventional type of fastener is the "C" form, as is shown in Fig. 48. Care should be taken that no ragged ends are left on the joint, they having a tendency to work the belt off the pulley. A leather punch, which leaves clean punctures, should be used in making the holes at the belt ends in which the fastener is to be inserted. A knife cut leaves a hole that becomes ragged and expansive, out of which the fastener will soon work. An exceptionally strong opening for the fastener can be made by inserting eyelets, such as are used on shoes. Another important precaution is that the leather should be allowed to stretch before being used. Soak it thoroughly, hang a weight on one, and suspend it by the other end for a few days

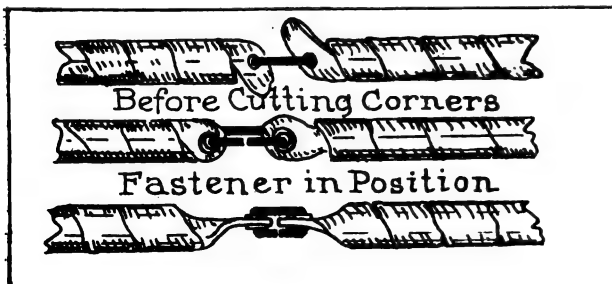


Fig. 48—Method of Properly Fastening Ends of Twisted Leather Belts for Grooved Pulleys.

MODERN STREET WASHING METHODS.

A MOTOR street sprinkler and flusher that is attracting great attention from municipal officials has been produced recently by the Tiffin Wagon Company, Tiffin, O. It consists of a 900-gallon tank mounted on a Tiffin 3½-ton truck and equipped with devices to provide pressure for power sprinkling, power flushing, or it may be used for gravity sprinkling.

The motor used to provide tank pressure is entirely separate from the truck motor. It is located at the rear of the truck and has a separate cooling and ignition system. It takes its gaso-

that operator can throw two streams on one side of the street, or adjust either nozzle at any angle that may be required. The nozzles are located at the extreme front of the truck, where they can be seen readily from the driver's seat.

The range of the streams thrown from the nozzles is so great that they will cover an exceptionally wide street at one passage. Though the tank would ordinarily be filled from a hydrant, it is possible, by the use of the pump, to fill it from a river or cistern if that is desired.

The machine accomplishes economically every sort of work for which a flusher can be used. It obviates the difficulties that arise in the use of an automatic flusher in cities where water pressure is low. It travels faster than a horse wagon and a given amount of water can be spread over a greater area, which is an important consideration in cities where water is expensive. Trucks have almost invariably been found to yield a lower operating cost in this sort of service than horse drawn vehicles doing similar work, and this flusher shares in the common ability of motor apparatus to do more and better work at less expense.

The truck chassis on which the tank is mounted

is of generally accepted design. It is a Continental four-cylinder, L head type, with water cooling, and cylinders cast en bloc. Bore is 4⅛ inches and stroke 5¼ inches. Ignition is by Bosch high-tension magneto.

The clutch is a leather faced Hartford construction, with expanding springs. The gearset is of the selective type with three speeds forward and reverse, assembled with the jackshaft and supported by a frame cross member and heavy steel hangers. Frames are pressed steel channels suspended on cross jack springs. The front axles are I beam section forgings and the rear axles of Timken rectangular type. The wheel-



Tiffin Motor Street Sprinkler and Flusher, Which Washes Exceptionally Wide Streets at a Single Passage.

line from the same tank as the truck motor. It is of the four-cylinder type.

A centrifugal pump is operated by this motor, which will provide a pressure of 60 pounds to the square inch. Owing to the fact that propelling mechanism is entirely separate from the truck motor, the operator may change the vehicle speed at will without in any way affecting the tank pressure. All controlling devices for running sprinkling or flushing are easily reached from the driver's seat.

Between the pump and the pump motor a flexible coupling is provided. The two flushing nozzles are swung on ball and socket joints, so

base is 140 inches. Wheels are 36 by four-inch forward and 36 by 3½ dual at the rear.

The steering gear is an irreversible screw and nut type, with the steering column on the left side. There is a 10-inch external contracting brake, and a 12-inch internal expanding brake on the rear wheels.

Before entering the truck field the company had for years built special municipal horse-drawn wagons of every type, and for use on truck chassis, will undertake the construction of any special apparatus that may be desired.

PACKARD TRUCKS ARE DISTINCTIVE.

One general design has been adopted in the construction of the new line of Packard trucks, which make those vehicles distinctive wherever they appear. While the different capacity machines differ from each other in some details, the appearance of each is identical. The accompanying illustration is a good example of this characteristic of Packard vehicles, one being the smallest capacity machine and the other the largest, the three ton.

Six machines of varying capacities make up the new Packard series. The range is from one ton to six, and it is interesting to note that of these the smallest is a size never before built by the Packard company. The one-ton machine is the "star" of the line of maximum duty vehicles, and it is equipped with all that is necessary to withstand the stresses of carrying its load at relatively high speed.

The capacity of the chassis is 3000 pounds, including the body, and it has a horsepower rating of 25.6 by the S. A. E. formula. It is limited to a normal speed of 16 miles an hour, but when high speed is required it is limited to 18 miles. When sold for a special high speed it has a limitation of 20 miles an hour, but these speeds must be approved by the transportation engineer. The standard wheelbase is 126 inches, and the special wheelbase is 144 inches.

The motor is an L head type, with the cylinders cast en bloc, with a bore of four inches and stroke of 5½ inches.

The power plant is a unit type and has the clutch assembled with the motor. An automatic governor regulates the engine so that a predetermined vehicle speed cannot be exceeded. High efficiency from a low-grade fuel is assured by the carburetor having a hot water jacket and hot air intake. A centrifugal pump circulates the water through a cellular radiator independently mounted. Lubrication is by the Packard circulatory system that will afford satisfactory lubricity at all engine speeds. Ignition is by a Packard-Bosch high-tension magneto, duplex system.

The clutch is a multiple disc type with hardened plates faced with asbestos fabric. The transmission gearset is a progressive sliding gear construction that has three forward ratios and re-



The One and Three-Ton Packard Trucks Side by Side and Demonstrating the Similarity of Appearance and Design.

verse. The drive is by a shaft, worm and worm wheel to a full floating rear axle, the moving parts of which are operated in a bath of oil. Springs are semi-elliptic, the forward set being mounted under the frame and the rear set at the sides of the chassis frame. The service brake operates on the main driving shaft, is cooled by a fan, and it has power to lock the wheels in normal operating conditions. The emergency brake shoes expand within large drums on the rear wheels, having overhead hinges to prevent rattle. The steering column is at the left side, the gear being worm and wheel type with the worm and wheel forged integral with their respective shafts. The control levers are operated by the driver's left hand. This size truck is the result of extraordinary research and preparatory work on the part of the Packard company.

CINEMA STAR BUYS A SCRIPPS-BOOTH.

Attracted by the individuality and the especially fine fittings and equipment of the Scripps-Booth car, as well as by its moderate price for the value given, Ruth Stonehouse, not yet 20 years of age and already a high salaried moving picture actress, recently decided upon that make of car and purchased it. As a further point of individuality, her initials are placed upon the panels. The car is painted a chocolate brown. In this car, Miss Stonehouse travels to the various localities called for in the play in which she may be acting.

STUDEBAKER TO HELP TOURISTS.

Studebaker dealers and service stations in the towns along the touring routes from coast to



Ruth Stonehouse in Her Scripps-Booth Car.

coast have been instructed to help tourists using Studebaker cars, not only by supplying as prompt service as possible on all work done on the cars, but to secure hotel accommodations for all tourists in advance on receipt of letters or telegrams stating when the tourist will reach the city. The touring routes will be used so much this year that the matter of finding accommodations is important and this service, the Studebaker Corporation believes, will add much to the enjoyment of the tour by its patrons.

LINCOLN HIGHWAY GUIDE READY.

A book containing all information that might prove useful to the tourist over the Lincoln Highway has been issued by the Lincoln Highway Association, Detroit, and is now being distributed. It contains minute directions as to the

route, mileages and other facts of that kind, and in addition much valuable information regarding places where supplies may be obtained and accommodations secured. It also gives directions for camping at night in the territory west of Omaha.

COMPILES ROAD DATA.

With a view to collecting as many useful facts as possible about the mileage of roads now in the United States, the cost of new roads and their comparative economy, the Department of Agriculture has sent out 15,000 question blanks to all parts of the country and will continue to send them out in years to come.

One of these asks for the mileage of roads now in use in the various counties and divides them into classes as follows: Brick, concrete, macadam with the addition of some substance such as oil tar or asphalt, plain macadam, gravel, shell, other hard surface roads, sand and clay mixture, common earth roads, properly built and unimproved roads.

Other blanks ask for information regarding tax rates for roads and the amount of money spent on them. Another blank is concerned with the names of local road officials, and the fourth, with bond issues and county indebtedness for road purposes.

This information will be gathered every year and comparisons are expected to supply a good record of road progress all over the country, as well as to establish the types of roads that wear best and supply the best service for the smallest money.

PENNSYLVANIA'S GOOD ROADS DAY.

On May 26, "Good Roads Day" in Pennsylvania, it is expected that more than 500,000 volunteer workmen will be at work upon the highways in the 67 counties of the state. In one county alone, Blair, more than 20,000 men have signified their intent to co-operate in restoring the highways of their commonwealth, while motor organizations and civic clubs are co-operating with the several county commissioners. The workmen will be taken to and from their work in automobiles.

JITNEY NEWS FROM EVERYWHERE.

WHEN the Detroit United Railway lines were tied up suddenly on May 13 by a strike, the Chalmers Motor Company, which was in the midst of its spring rush, hurriedly improvised a very complete passenger service to carry its workmen to the factory from every part of the city and return them to their homes at night so that very little time might be lost.

The plant, like most of Detroit motor car factories, is on the outskirts of the city, and some of the men travel eight or 10 miles to their work. In the morning every available car was used to pick up employees, and by 9 o'clock 95 per cent. were at work. By five at night a complete system had been worked out and printed forms explaining the system had been distributed throughout the factory.

Over 100 touring cars were pressed into service; others were stripped of bodies and wooden platforms built on the chassis, with seats accommodating from 12 to 20 people. Large trucks used for hauling material were made into carryalls. The men were given badges entitling them to rides, and the cars and trucks fitted with great signs, "Chalmers Auto Service for Employees Only."

These vehicles worked on definite routes, covering all the main street car lines in the city, and, while the strike lasted, the Chalmers work people were taken to the factory promptly in the morning and returned to their homes at night.

The demand for light trucks for jitney service has led to a number of International Harvester model E trucks being applied to that purpose. In Omaha three, with special jitney bodies, are in operation. These have a side entrance just behind the driver, so that he can conveniently collect fares. A step is provided on which passengers may easily enter and leave the 'bus.

A committee of the Oakland, Cal., Chamber of Commerce after an extensive investigation of the jitney 'bus has made a very complete report, which condemns it on the following grounds: It has caused a shrinkage of millions of dollars in the value of street railway secur-

ities, many of which are held by savings banks, public institutions and worthy investors. It robs the city of a portion of the earnings of the street railway companies, which many of them get under their franchises. It increases the cost of keeping up streets and roads by wearing out the pavement. As it usually supplies only short haul transportation it is likely, if permanently established, to increase the congestion in the apartment house districts of cities and limit the upbuilding of the outlying portions. It is likely for the same reasons to increase property valuations near the centre of cities, while it reduces those in the outlying districts. It increases con-



Transporting Chalmers' Workmen in Motor Trucks When Street Car Men Went on Strike.

gestion in streets. Because of the high cost of operation it cannot be permanently successful. If it is successful it will take the form of the motor 'bus rather than of the present jitney.

Undeterred, however, by this committee's findings, the 'bus continues to expand in places where it has not been before. In Boston the Nickel Auto 'Bus Company has been organized and has one 'bus running from Park and Tremont streets to Fenway park. The first day the 'bus was out the police took the driver's name. This was understood by the officers of the company to be the first step in a legal attack on the enterprise. The company claims there is no law in Massachusetts at present which can be used to regulate the business.

The Waterbury Jitney Service, Inc., capitalized at \$50,000, has begun business in Water-

bury, Conn., with a schedule calling for the operation of cars from 6:30 a. m. to 12:30 a. m. Tickets are to be sold at 25 for a dollar and universal transfers given. The company starts with 30 cars, but is expected to increase the number to 200 within 30 days.

A 'bus line through the mountains of Vermont, over a beautiful scenic route, has been established. It began operation May 15, between Stockbridge on the White River railroad and Rutland. Fast steam driven 'busses, seating 15 passengers, are used. They pass through Pittsfield, Sherburne and Mendon. The 'bus saves the traveller 65 cents in railroad fare and an hour and half in time. Railroad officials are behind the line.

In Vancouver the many jitney operators have

during March and April which last year went into the treasury of the Rhode Island Company. Its receipts for this year show a falling off of that amount over the receipts for the same period last year. President A. E. Potter declares that during the summer months he expects the loss through jitney competition to be even larger.

Regulation of the jitney continues all over the country, and many of the ordinances have been of such a nature that they have either crushed out the business entirely or have greatly reduced the number of cars in service. This was the result of an ordinance passed in Ashtabula, O., where 15 jitneys were in operation until they were required to pay a \$100 a year license and bond their cars at \$5000. In Grand Rapids, Mich, a new ordinance provides that the jitneys

must pay license fees of from \$35 to \$60, and in addition the jitney drivers must pay half the salaries of the traffic squad.

The Massachusetts legislature has overwhelmingly defeated a bill requiring a bond of \$5000 for each car operated. In Savannah the jitney men secured an injunction to prevent the city from enforcing a jitney ordinance which they said was discriminatory and illegal.

At the first national convention of jitney operators, held recently in Kansas City, Mo., an organization on a national scale to protect the interests of the jitney operators was perfected. P. T. Allen of Springfield, Mo., an attorney, was

elected president, and E. K. Carnes of the Kansas City Jitney Association, was appointed secretary of the national organization.

The Independent Jitney Association of Milwaukee, Wis., has formed the Automobile Liability Association, a limited mutual insurance company to take care of the insurance of its members. The company will operate under the state laws. It cannot do business until applications for 200 policies have been received. This organization is making a fight for the right of a driver to smoke. It also wants the council to declare that members of a single family can crowd into a car in any way they please, and that any one under 12 years old can sit on the lap of another passenger if he or she is willing.



International Harvester 'Busses in Use in Omaha, Neb., as Jitneys.

formed an elaborate organization to control the business. This organization appoints a committee to control routes and rates. All the jitneys are supervised by an experienced traffic man hired by the association. Mutual insurance is provided against loss in damage suits, and it is planned to institute a transfer system throughout the city to meet the street railway company's expected cut in fares.

The Motor Carriers' Association has been organized in Worcester, Mass., with a capital of \$50,000, to operate a jitney line. The 'busses will seat from 12 to 20 people and will run to various sections of Worcester. A few of them have already begun operation.

Jitney owners have taken in at least \$95,000

INDUSTRIAL HAPPENINGS AND COMMENT.

The Bosch Magneto Company of New York opened its new and capacious offices at 1764 Broadway, New York City, on May 15. The change is in the nature of expansion, made necessary by the increase of Bosch business. Among the departments moved are the executive, sales and clerical forces, and they are now in the same building with the advertising, circularizing and dealers' selling service departments. A special installation department for the fitting of Bosch lighting, starting and ignition systems has been established in the rear of the building, and serves as an auxiliary of the company's garage at 223 West 46th street.

The Dunlap Wire Wheel Company's Plant, Long Island City, N. Y., has been purchased by the Fickling Enameling Corporation, of which W. I. Fickling is president. The Fickling company, which specializes in finishing coats for automobiles by the "Radio" process, is prepared to continue the services rendered by the Dunlap company.

The Singleton Company, Cleveland, O., advertising specialist, is being incorporated under the name of the Singleton-Tripp Company of which J. F. Singleton will be president and treasurer, and W. H. Tripp, vice president. Mr. Tripp recently joined Mr. Singleton, and brings to the corporation an experience covering 22 years in general national advertising and merchandising, he having been eastern advertising manager of the Butterick publications, western advertising manager of a leading trade journal, and director of promotion and sales work in the agency field.

The Russel Motor Axle Company, North Detroit, Mich., manufacturer of motor car axles, has been forced by increased business, particularly in axle equipment for commercial cars, to commence the erection of an addition to its plant. The new structure will be 120 by 120 feet.

The Garage Equipment Manufacturing Company, Milwaukee, Wis., has changed its name to that of the Gemco Manufacturing Company of Milwaukee. The company explains that only a few years ago the line of products was confined to a very limited line of automobile supplies. Today there are over 200 articles in the extensive line of standard automobile accessories and Ford specialties in addition to the large department devoted exclusively to the manufacture of axles, windshields, mufflers, etc., and a wide range of stampings, castings and machine work.

The Martin V. Kelley Company, advertising agency, will begin operations June 1 in the Second National Bank building, Toledo, O. Martin V. Kelley, president of the company, was formerly vice president of the Charles H. Fuller Company. R. E. Keller is vice president.

Stephen J. Richards, Needham, Mass., was adjudicated bankrupt on Feb. 13 and the first meeting of the creditors was held at room 320, Tremont building, Boston, May 22, to prove claims, appoint a trustee, examine the bankrupt and transact any other business appropriate to the meeting. Emery B. Gibbs was the referee.

The King Motor Car Company, Detroit, Mich., announces that it has shipped its second train load of eight-cylinder motor cars to its Chicago distributor, the King Motor Company.

The National Automobile Press Company, Lehighton, Penn., a \$1,000,000 concern, was placed in the hands of a receiver, M. O. Kuntz, on Feb. 19. Recently E. P. Jennings and A. B. Jennings, president and secretary, respectively of the company, applied to the court for the removal of the receiver, alleging that he has allowed the plant to remain idle and has refused a bona fide offer made by them for the purchase of the property. Counsel for the receiver and the general stockholders opposed the petition. The court reserved decision pending additional evidence.

The Chalmers Motor Car Company, Detroit, Mich., was host to those of its dealers from Ohio, Indiana, West Virginia, Michigan, Kentucky and Canada who are competing in the country-wide Chalmers sales contest, which

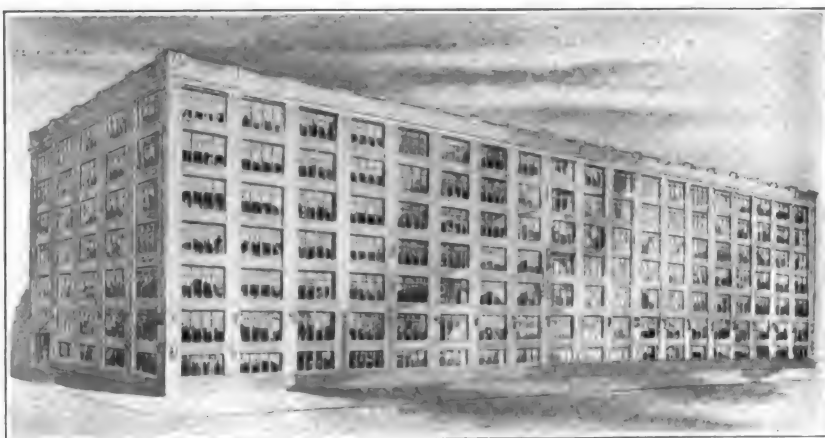
closes June 19. The meeting took the form of a sales convention and an inspection of the factory.

The Indian Refining Company, 17 Battery place, New York City, producer of Havoline oil, publishes a periodical that is "issued occasionally, but helpful continually," according to a statement in the publication. The company states that the demand from dealers has made it necessary to print larger editions. There is a large amount of valuable information in the publication.

The Joseph Dixon Crucible Company, Jersey City, N. J., is distributing among motorists on request, lubricating charts that show where and how to lubricate a car properly. The chart is very easily read and shows a plan view of a chassis with each part, where lubrication is necessary, marked with a number.

The Midgley Tire and Rubber Company, Lancaster, O., is now placing a complete line of tires and tubes on the market, after several months of active preparation.

The Dayton Engineering Laboratories Company, Dayton, O., anticipating a rapid growth of its business, had purchased adjoining property against the need of expanding the plant. About a year ago the company began to feel cramped, which became acute in recent weeks, and it is now constructing the building illustrated on this page. It is expected that before winter arrives the non-productive departments of the company will have been moved to the new structure, which is to be used chiefly for the manufacture of a new series of



Architect's Sketch of the New Building Being Erected for Deleo in Which a Line of New Products Will Be Manufactured.

new products which will soon be announced. The building is to be of steel and concrete with a facing of brick.

The Saxon Motor Company, Detroit, Mich., is publishing and mailing upon request, an exceptionally well composed booklet under the title of "Saxon Days." While it contains considerable information for the Saxon owner and dealer, it will be found to also have great interest for owners and distributors of other makes of machines. One article relates the experiences of a motorist who crossed the Rocky mountains in snow time, and several photographs pointedly illustrate the story. The booklet is printed in two colors.

Bromfield & Field, Inc., an advertising concern, located at 1710 Madison avenue, New York City, announces that Arthur O. Perlitz has become associated with their organization. Mr. Perlitz has had valuable selling experience, a measure of which was gained while with the Electric Vehicle Company, Hartford, Conn., and the Locomobile Company of America's branches at Chicago and Minneapolis. His entrance into the Bromfield & Field, Inc., is a part of a general plan of development of that organization along the lines of merchandising and salesmanship.

The Bollstrom Products Sales Company, Battle Creek, Mich., has secured control of an improved four-wheel drive for pleasure and commercial cars, and delivery of samples will begin in November. Agency contracts covering several large cities have already been made.

bury, Conn., with a schedule calling for the operation of cars from 6:30 a. m. to 12:30 a. m. Tickets are to be sold at 25 for a dollar and universal transfers given. The company starts with 30 cars, but is expected to increase the number to 200 within 30 days.

A 'bus line through the mountains of Vermont, over a beautiful scenic route, has been established. It began operation May 15, between Stockbridge on the White River railroad and Rutland. Fast steam driven 'busses, seating 15 passengers, are used. They pass through Pittsfield, Sherburne and Mendon. The 'bus saves the traveller 65 cents in railroad fare and an hour and half in time. Railroad officials are behind the line.

In Vancouver the many jitney operators have

during March and April which last year went into the treasury of the Rhode Island Company. Its receipts for this year show a falling off of that amount over the receipts for the same period last year. President A. E. Potter declares that during the summer months he expects the loss through jitney competition to be even larger.

Regulation of the jitney continues all over the country, and many of the ordinances have been of such a nature that they have either crushed out the business entirely or have greatly reduced the number of cars in service. This was the result of an ordinance passed in Ashtabula, O., where 15 jitneys were in operation until they were required to pay a \$100 a year license and bond their cars at \$5000. In Grand Rapids, Mich, a new ordinance provides that the jitneys

must pay license fees of from \$35 to \$60, and in addition the jitney drivers must pay half the salaries of the traffic squad.

The Massachusetts legislature has overwhelmingly defeated a bill requiring a bond of \$5000 for each car operated. In Savannah the jitney men secured an injunction to prevent the city from enforcing a jitney ordinance which they said was discriminatory and illegal.

At the first national convention of jitney operators, held recently in Kansas City, Mo., an organization on a national scale to protect the interests of the jitney operators was perfected. P. T. Allen of Springfield, Mo., an attorney, was

elected president, and E. K. Carnes of the Kansas City Jitney Association, was appointed secretary of the national organization.

The Independent Jitney Association of Milwaukee, Wis., has formed the Automobile Liability Association, a limited mutual insurance company to take care of the insurance of its members. The company will operate under the state laws. It cannot do business until applications for 200 policies have been received. This organization is making a fight for the right of a driver to smoke. It also wants the council to declare that members of a single family can crowd into a car in any way they please, and that any one under 12 years old can sit on the lap of another passenger if he or she is willing.



International Harvester 'Busses in Use in Omaha, Neb., as Jitneys.

formed an elaborate organization to control the business. This organization appoints a committee to control routes and rates. All the jitneys are supervised by an experienced traffic man hired by the association. Mutual insurance is provided against loss in damage suits, and it is planned to institute a transfer system throughout the city to meet the street railway company's expected cut in fares.

The Motor Carriers' Association has been organized in Worcester, Mass., with a capital of \$50,000, to operate a jitney line. The 'busses will seat from 12 to 20 people and will run to various sections of Worcester. A few of them have already begun operation.

Jitney owners have taken in at least \$95,000

INDUSTRIAL HAPPENINGS AND COMMENT.

The Bosch Magneto Company of New York opened its new and capacious offices at 1764 Broadway, New York City, on May 15. The change is in the nature of expansion, made necessary by the increase of Bosch business. Among the departments moved are the executive, sales and clerical forces, and they are now in the same building with the advertising, circularizing and dealers' selling service departments. A special installation department for the fitting of Bosch lighting, starting and ignition systems has been established in the rear of the building, and serves as an auxiliary of the company's garage at 223 West 46th street.

The Dunlap Wire Wheel Company's Plant, Long Island City, N. Y., has been purchased by the Fickling Enameling Corporation, of which W. I. Fickling is president. The Fickling company, which specializes in finishing coats for automobiles by the "Radio" process, is prepared to continue the services rendered by the Dunlap company.

The Singleton Company, Cleveland, O., advertising specialist, is being incorporated under the name of the Singleton-Tripp Company of which J. F. Singleton will be president and treasurer, and W. H. Tripp, vice president. Mr. Tripp recently joined Mr. Singleton, and brings to the corporation an experience covering 22 years in general national advertising and merchandising, he having been eastern advertising manager of the Butterick publications, western advertising manager of a leading trade journal, and director of promotion and sales work in the agency field.

The Russel Motor Axle Company, North Detroit, Mich., manufacturer of motor car axles, has been forced by increased business, particularly in axle equipment for commercial cars, to commence the erection of an addition to its plant. The new structure will be 120 by 120 feet.

The Garage Equipment Manufacturing Company, Milwaukee, Wis., has changed its name to that of the Gemco Manufacturing Company of Milwaukee. The company explains that only a few years ago the line of products was confined to a very limited line of automobile supplies. Today there are over 200 articles in the extensive line of standard automobile accessories and Ford specialties in addition to the large department devoted exclusively to the manufacture of axles, windshields, mufflers, etc., and a wide range of stampings, castings and machine work.

The Martin V. Kelley Company, advertising agency, will begin operations June 1 in the Second National Bank building, Toledo, O. Martin V. Kelley, president of the company, was formerly vice president of the Charles H. Fuller Company. R. E. Keller is vice president.

Stephen J. Richards, Needham, Mass., was adjudicated bankrupt on Feb. 13 and the first meeting of the creditors was held at room 320, Tremont building, Boston, May 22, to prove claims, appoint a trustee, examine the bankrupt and transact any other business appropriate to the meeting. Emery B. Gibbs was the referee.

The King Motor Car Company, Detroit, Mich., announces that it has shipped its second train load of eight-cylinder motor cars to its Chicago distributor, the King Motor Company.

The National Automobile Press Company, Lehighton, Penn., a \$1,000,000 concern, was placed in the hands of a receiver, M. O. Kuntz, on Feb. 19. Recently E. P. Jennings and A. B. Jennings, president and secretary, respectively of the company, applied to the court for the removal of the receiver, alleging that he has allowed the plant to remain idle and has refused a bona fide offer made by them for the purchase of the property. Counsel for the receiver and the general stockholders opposed the petition. The court reserved decision pending additional evidence.

The Chalmers Motor Car Company, Detroit, Mich., was host to those of its dealers from Ohio, Indiana, West Virginia, Michigan, Kentucky and Canada who are competing in the country-wide Chalmers sales contest, which

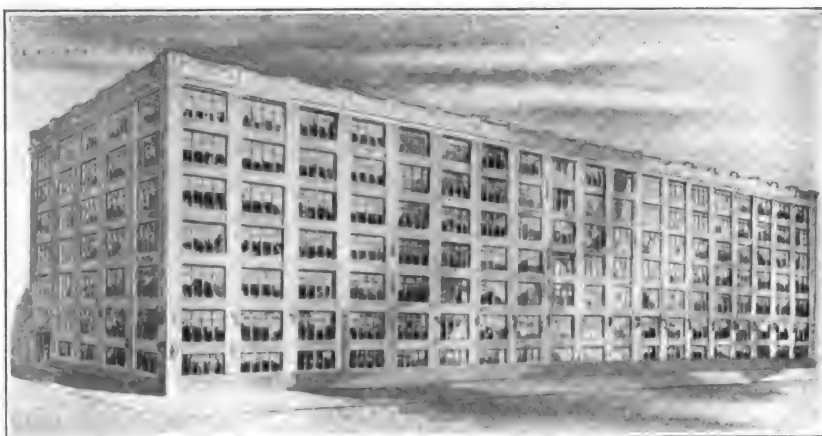
closes June 19. The meeting took the form of a sales convention and an inspection of the factory.

The Indian Refining Company, 17 Battery place, New York City, producer of Havoline oil, publishes a periodical that is "issued occasionally, but helpful continually," according to a statement in the publication. The company states that the demand from dealers has made it necessary to print larger editions. There is a large amount of valuable information in the publication.

The Joseph Dixon Crucible Company, Jersey City, N. J., is distributing among motorists on request, lubricating charts that show where and how to lubricate a car properly. The chart is very easily read and shows a plan view of a chassis with each part, where lubrication is necessary, marked with a number.

The Midgley Tire and Rubber Company, Lancaster, O., is now placing a complete line of tires and tubes on the market, after several months of active preparation.

The Dayton Engineering Laboratories Company, Dayton, O., anticipating a rapid growth of its business, had purchased adjoining property against the need of expanding the plant. About a year ago the company began to feel cramped, which became acute in recent weeks, and it is now constructing the building illustrated on this page. It is expected that before winter arrives the non-productive departments of the company will have been moved to the new structure, which is to be used chiefly for the manufacture of a new series of



Architect's Sketch of the New Building Being Erected for Delco in Which a Line of New Products Will Be Manufactured.

new products which will soon be announced. The building is to be of steel and concrete with a facing of brick.

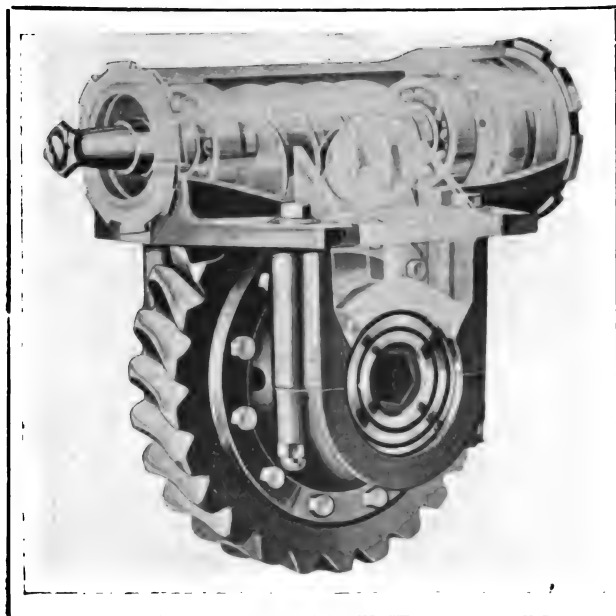
The Saxon Motor Company, Detroit, Mich., is publishing and mailing upon request, an exceptionally well composed booklet under the title of "Saxon Days." While it contains considerable information for the Saxon owner and dealer, it will be found to also have great interest for owners and distributors of other makes of machines. One article relates the experiences of a motorist who crossed the Rocky mountains in snow time, and several photographs pointedly illustrate the story. The booklet is printed in two colors.

Bromfield & Field, Inc., an advertising concern, located at 1710 Madison avenue, New York City, announces that Arthur O. Perlitz has become associated with their organization. Mr. Perlitz has had valuable selling experience, a measure of which was gained while with the Electric Vehicle Company, Hartford, Conn., and the Locomobile Company of America's branches at Chicago and Minneapolis. His entrance into the Bromfield & Field, Inc., is a part of a general plan of development of that organization along the lines of merchandising and salesmanship.

The Bollstrom Products Sales Company, Battle Creek, Mich., has secured control of an improved four-wheel drive for pleasure and commercial cars, and delivery of samples will begin in November. Agency contracts covering several large cities have already been made.

CHASE TRUCKS INCLUDE EUROPEAN IDEAS.

THE worm drive feature that the Chase Motor Truck Company, Syracuse, N. Y., has applied to its new standardized line of trucks, in-



Sheldon Worm Shaft, Gear Wheel and Differential Assembly.

corporates several ideas that have been standard in European practise for some time, and the other components of the machines are the best products of the leading specialists. To determine on what the company considered desirable for its trucks, a comprehensive study covering a long period was made of the transportation field and manufacturing facilities, both in this country and abroad.

The standard adopted was first brought out by the Chase company early in 1914, and experience since then has satisfied the designers that they have an unusual product to offer their customers. Three sizes of these machines, with slight modifications from the original design, are now being constructed, while the manufacture of all previous types has been abandoned.

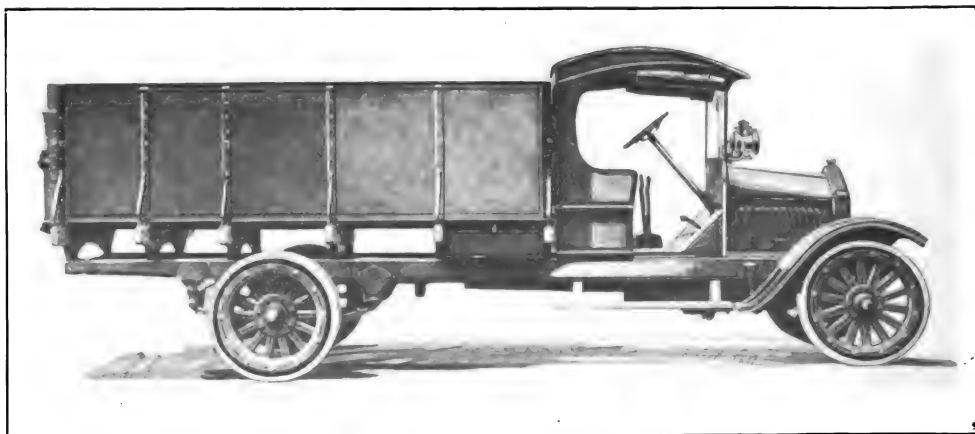
However, the company will supply parts for those machines as long as they are in service.

The trucks of the new line are designated as models O, R and T, having 7000, 3000 and 1500-pound capacities respectively. The power plants are assembled in units with the engines, clutches and transmission gearsets, and the drive is by long shafts to worm and gear wheel full floating rear axles, the construction being the overhead worm or David Brown type.

Another distinctive feature of the design is that the frames are built to yield to the driving stresses, and the strains from chassis distortion are minimized. The moving parts of the chassis are very well protected, and all parts insure long endurance in all conditions of service.

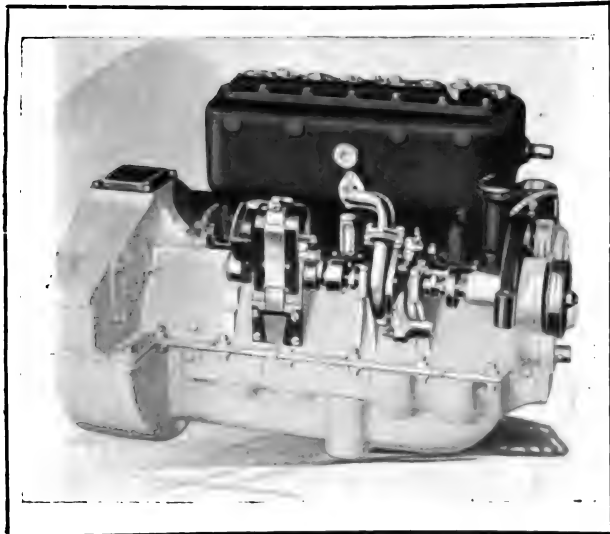
The units of the machines are of high standard, being Continental motors, Brown-Lipe multiple disc clutches and selective transmission gearsets, Sheldon axles and springs, Timken bearings, Bosch ignition systems, Holley carburetors and Pierce speed controllers.

Practically the only difference in the types, except in proportions, is in the motors, though those units are the product of one manufacturer. The smallest machine has the Continental model N, with cylinder bore of $3\frac{1}{2}$ inches and stroke of five inches, which is rated at 19.6 horsepower by the S. A. E. formula. This is an L head type, with the cylinders cast en bloc, with head open, this being closed with a large cover plate. The crankshaft is mounted on three bearings. The camshaft is mounted on two very large bearings and the valve action is conventional. Timing gears are helical and are practically noiseless. Lubrication is by the force feed and splash, and



Chase Model O 7000-Pound Chassis Equipped with Body Adapted for Bulk Loads.

the condition of the oil supply is indicated by a float-operated gauge. Cooling is by a thermosiphon circulation of water through the engine



Type of Continental Motor Used in Chase Trucks.

jackets and radiator, and is very efficient.

The Continental model C is used in the 3000-pound capacity truck, it being an L head type, with cylinders cast en bloc, having a bore of $4\frac{1}{8}$ inches and stroke of $5\frac{1}{4}$ inches, which by the S. A. E. formula gives a horsepower rating of 27.2. The water jacket head is cast separately. The crankshaft is mounted on three large bearings. The camshaft is forged with the cams integral, and the timing gears are helical cut. Plunger pumps driven by eccentrics from the camshaft flood the rear main bearings and the timing gears with oil, lubricity of other parts is assured by the splash system. Cooling is by water circulated by centrifugal pump through the water jackets and the large radiator.

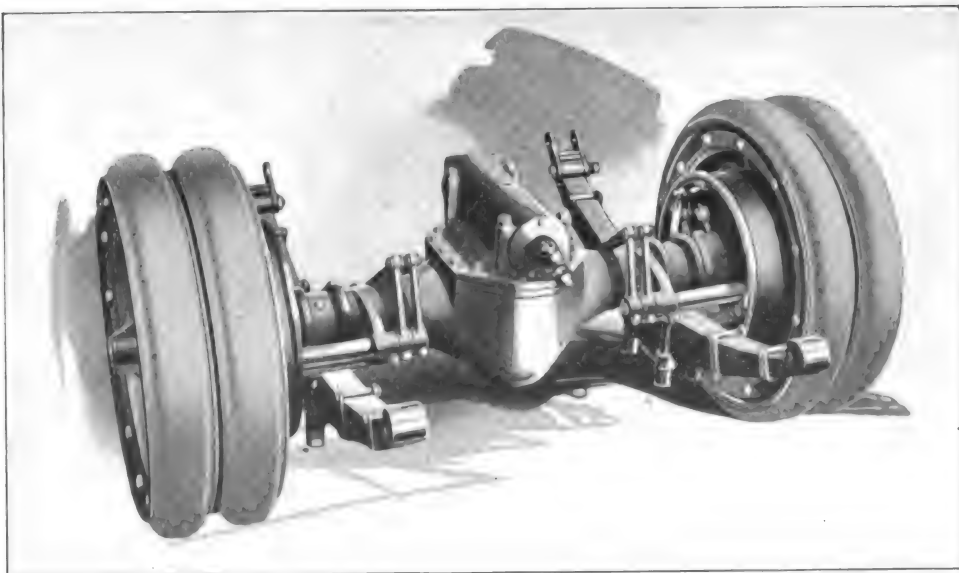
Model O truck has the Continental motor, model E, which is an L head type with the cylinders cast in pairs, bore of $4\frac{1}{2}$ inches and stroke of $5\frac{1}{2}$ inches, the engine

being rated at 32.4 horsepower by the S. A. E. formula. Large water jacket heads are fitted to the cylinder units, which insures an efficient cooling system. The other details of this motor correspond practically in all essential points with model C engine, excepting in dimensions.

All three motors are mounted on three points. The clutches are multiple disc, the dry plates being faced with Raybestos. The transmission gearsets are selective sliding gear constructions, those in the 1500 and 3000-pound trucks having three speeds forward and a reverse, while the 7000-pound machine has four speeds forward and a reverse. The driving shafts are provided at either end with Blood Brothers' block and trunion universal joints.

The rear axles are Sheldon designed, the worm shaft and gear being so installed in the axle housing that they cannot be out of alignment after adjustment. The differential is assembled with the gear and the assembly and the driving shafts are mounted on large annular bearings with special thrust bearings for the worm shaft and differential.

Sheldon semi-elliptic springs are used, the forward set being mounted on generous spring seats, the rear being underslung. There are no radius rods, the drive being through the rear springs, as is the common European practise. The steering gears are worm and nut types, and spring shock absorbers are fitted to minimize the stresses upon the worm or hand wheel. The clutch is operated by the left foot pedal.



Spring Installation on Sheldon Rear Axle and Worm of Chase Trucks.

A. A. A. TO FIGHT DOUBLE TAXATION.

IN THE nation-wide fight against double taxation as relates to motor vehicles, the American Automobile Association has gone on record for a uniform method of taxation. The decision was reached after a two hours' discussion at the annual convention of the association at Boston, Mass., during which several representatives of the 150 present from 20 states gave their opinions upon the subject.

Charles T. Terry of the legislative board and of New York, proposed the following resolution, which was adopted:

Whereas, The motor driven vehicle has become the common means of transportation, commercially and socially, that it enters into every progressive phase of human existence, and should no longer be considered as a special means of travel; therefore, be it

Resolved That the American Automobile Association, through its national legislative board contends, in the several states and in the congress and the courts of the United States, for a uniform method of taxation, which shall recognize the fact that an automobile should now be included in a general property classification and taxed only as personal property, that no other tax whatever shall be imposed either in connection with the vehicle or its operation, except a nominal registration fee covering only the clerical cost of the issuing of an identification number for the vehicle and its operator in order that the police powers of the states or the municipalities may not be impaired.

The resolution met with opposition. L. R. Speare, ex-president of the association and representative of the Massachusetts State A. A., declared that though the Bay State motorists had paid last year nearly \$1,000,000 and would pay more than that amount this year, they were satisfied to continue paying the double taxation.

The convention adopted two other resolutions. One petitioned Congress to establish a bureau of roads to be under the postmaster-general or the secretary of agriculture. Another asked that the federal aid propaganda be continued so that all the states should receive a share of the money for improved roads.

LIABILITY OF GARAGE OWNERS.

The liability of a garage owner in a case where a person has been injured while being driven in his own machine by a driver furnished such persons for hire by the garage owner, has been established in the Court of Common Pleas of Cuyahoga county, Ohio. The case was that of Jones vs. the Baker Motor Vehicle Company, and it appeared in evidence that Mrs. Jones was the owner of a car which was kept by the Baker company in its garage as a "boarder," and that

upon her call the company would furnish her with a driver at a fixed charge per hour, and that these drivers were instructed by the Baker company to drive "as directed by the owner" while out in the car.

Mrs. Jones claimed in evidence that she was injured in a collision with a dirt cart on a dark highway, the cart being without a light, and the automobile being driven by a Baker company driver. The court charged the jury that, as a matter of law, the driver of the car was, at the time of the accident, the agent and servant of the Baker company, and that if the company had not exercised due care in selecting a careful driver, or if the driver was negligent and his negligence caused the accident, the company was liable.

This ruling is said to be the first of its kind. If it is sustained by the higher courts it means, as a practical matter, that a garage owner or other person who supplies drivers to owners of cars, in the manner above described, is liable not only to the owner of the car, but also to third parties who may be injured through the carelessness of the driver.

SECOND-HAND AUTOMOBILES.

According to a recent decision handed down in a Pennsylvania court, if an automobile bought by a person is driven to the purchaser's home in another city, the purchaser can refuse the car and obtain the return of a deposit, if such has been made. A resident of Honesdale bought a car of a Scranton dealer, and the machine was driven under its own power to the purchaser, who refused it and demanded the return of the \$100 he had left on deposit. The court decided in the purchaser's favor and in addition ordered the inclusion of interest, amounting to \$16.

LOWER RATES FOR AUTO LIABILITY.

Charges for family coverage, in connection with automobile liability insurance, will be reduced in New York State, following a recent decision of the governing committee of the Workmen's Compensation Service Bureau. The proposed rates are 10 per cent. for one additional interest; 12½ per cent. for two, and 15 per cent. for three. The old rate, which was formulated a year ago at the conclusion of the automobile rate war, was 15, 25 and 35 per cent. respectively.

ROADS THAT KEEP PACE WITH TRAFFIC.

DUE TO the discovery of MacAdam, there was a long period in the recent history of modern roads when they were adequate to the

boulevard, Newton, Mass., was treated with a tar binder and since then the upkeep cost for five miles of this road, which is 60 feet wide, has been \$1200 a year. This includes cleaning and all work done on the surface. Traffic over it has been very heavy. There is a stretch in Cleveland, O., which is 10 years old. Plainfield, N. J., has used tarviated macadam since 1908 and it has been adopted as the standard road material.

Large parks and cemeteries have also adopted this material for their roads. The roadways are clean enough and dry enough to be used as walks and are still strong enough to stand the transportation of heavy monuments. Government engineers have used the material extensively about Washington, and the White House driveway

has not been tarviated since 1911.

With the growth of motor vehicle traffic, the usefulness of the tarviated road is expanding. Automobiles and motor trucks have now penetrated to even remote sections. The truck depends for its efficiency on its ability to carry very heavy loads, and the heavier the load the greater the requirements placed on road surfaces.

demands put upon them by the kinds of traffic that were prevalent at that time. When, however, the automobile and the motor truck began to use the smooth, hard macadam roads that had become common, these fine roads rapidly deteriorated.

This led to close study of the macadam road and of methods to render it indestructible. As a result bituminous binders, of which tarvia is one of the leading American examples, have again made the macadam road suitable for present day traffic.

Tarvia can be used in many cases on the original macadam roads without rebuilding them, and it is always easily added to the ingredients of a new road. This kind of a binder holds the stones used in the road so firmly that the suction created by pneumatic or solid rubber tires cannot pull them out.

It is now 10 years since binders of this type were introduced, and the experience of a few communities is typical of that entire period. Nine years ago Newton



West Webster Street, Chillicothe, Mo., Before Tarvia Was Used.

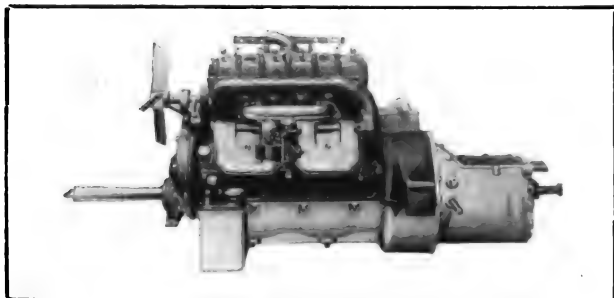


Improvement Obtained on the Same Street by the Use of Tarvia.

OAKLAND LOWERS PRICE FOR 1916 "FOUR."

New Refinements Added to Well Tried and Successful Chassis—In the Main the Car is Similar to 1915 Four-Cylinder Model.

"THE car of 51 refinements" was the slogan adopted by the Oakland Motor Car Company of Pontiac, Mich., to describe its 1915



Oakland Power Unit, Including Motor, Clutch and Transmission Gearset Completely Housed.

models. Those 51 refinements have been continued and several new ones added in 1916, the four-cylinder model which has just been announced. The price has been reduced from \$1200 to \$1050.

This car will be furnished in three models, a five-passenger touring car, a two-passenger roadster and a two-passenger speedster. All of the well known principles of Oakland construction have been continued, light weight, great strength, high speed motor and low centre of gravity.

The most noticeable changes are in the bodies, which have been considerably enlarged. The radiator, hood, cowl and sides of the body have been raised, giving the car a much larger appearance. The seats have been widened and the driving compartment deepened, providing ample leg room for the driver in handling the car.

The motor used in this chassis is an Oakland-Northway with four $3\frac{1}{2}$ -inch bore by five-inch stroke, L head cylinders, cast en bloc. Motor, clutch and transmission gearset are assembled in one unit and completely housed in against the entrance of dust or the escape of noise. The motor is of the high speed type.

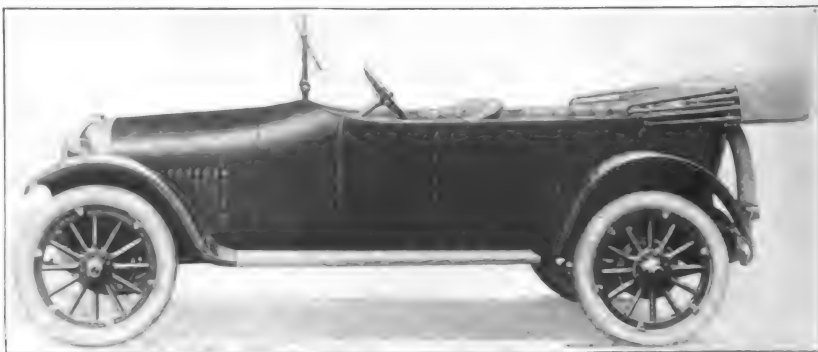
The unit power plant is suspended at three points on the frame. Exception-

ally large valves are used. These are made of tungsten steel, which has the quality of retaining its hardness at very high temperature which obviates the pitting of the valves. A high polish can be maintained on both the valve and the valve seat, which will prevent leaking after use and insure against loss of power through lessened compression.

The camshaft has been designed to produce a longer lift in the valves than is ordinary. This affords unusual efficiency of the valves, which is a large factor in power production of the motor, which will develop a speed of 2500 revolutions a minute, and deliver practically 40 horsepower. The crankshaft has three main bearings, of which the front is $1\frac{5}{8}$ inches diameter by $3\frac{3}{8}$ inches length; the centre $1\frac{7}{8}$ inches diameter by $2\frac{3}{8}$ inches length, and the rear $1\frac{15}{16}$ inches diameter by $3\frac{11}{16}$ inches length. The connecting rod bearings measure $1\frac{5}{8}$ inches diameter by $2\frac{1}{4}$ inches length. All bearings are made of special babbitt.

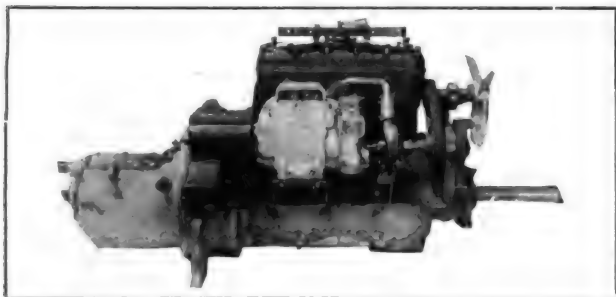
The cylinder head when removed gives complete access to the pistons and the inside of cylinders, as well as to the valves, a construction that facilitates the easy and rapid removal of carbon deposits. The pistons are crowned to obtain maximum strength and still retain the advantage of light weight. They are each fitted with nine thin carbon steel rings. Three rings are placed in each slot. Lubrication is accomplished by a circulating splash system.

A specially designed intake manifold and throttle valve is said to be unusually efficient in



The Five-Passenger Oakland Touring Model for the 1916 Season.

distributing gas equally among the cylinders, delivering as much to the first and fourth as to the second and third. The intake manifold is at the



Right Side of Oakland—Northway Motor, Showing Delco Starting and Lighting System.

left side of the motor, under the exhaust manifold, a design that locates the Marvel automatic float feed carburetor convenient for adjustment. Gasoline is supplied to the carburetor at even pressure by the Stewart vacuum gasoline feed system, which maintains an even pressure at the carburetor.

Cooling is by circulation of water forced by a centrifugal pump through the engine and radiator, the pump being coupled to the generator shaft just ahead of the Delco electrical unit. The water is forced into the centre of the engine water jacket at the right side.

The electrical system combines starting, lighting and ignition apparatus. A Delco combination generator and motor is used, which operates at six volts. There is but one wire, the current returning through the frame. When operating as a generator the unit is driven from the front wheel and when functioning as a starting unit it is geared to the flywheel at the rear. The ignition distributor is built integral with the generator.

An automatic spark advance is provided, which is entirely mechanical in its action and does not depend on magnetic attraction. It consists of a centrifugal governor which automatically advances the spark as the speed of the motor increases. The range of the operation of this device is fixed so that it may not exceed certain limits. If the hand spark lever is advanced the entire range of the automatic control moves up.

The current controlling device consists of an arm wiping a brush over a coil arranged with a view to producing a maximum current output at low speed. The charging rate of

the generator is such that the battery is practically always full to capacity. The storage battery, carried under the seat, is an Exide of 80-ampere-hours capacity.

Side lamps have been eliminated and the head lights are fitted with an approved dimming device. The electric horn is automatically disconnected when the ignition is switched off or locked, preventing boys on the street from tooting the horn in the owner's absence.

Short circuiting is insured against by the use of a circuit breaking relay which prevents the rapid discharge of the battery. This relay is placed with the control button unit and announces by a loud clicking noise that a short circuit has taken place.

The clutch is a leather faced cone and the sliding selective transmission gearset affords three forward speed ratios and reverse. The driving system is a Hotchkiss type, having a tubular propeller shaft and two universal joints. In this chassis the traction thrust and torque are taken by the rear springs, which act as a cushion when the car is started suddenly or when the brakes are applied quickly. This eliminates shocks and saves the gears and bearings throughout the entire driving mechanism. It also reduces weight and prevents the wheels slipping when the clutch is engaged quickly.

The rear axle is of the one-bearing, full-floating type. The wheelbase is 112 inches and the tires are 33 by four-inch, non-skid shoes being fitted on the rear. Wheels are an artillery type.

The pressed steel channel frame tapers throughout its entire length, and is unusually wide at the rear, so that the rear springs are directly under the frame side members. The scrolls at the rear springs are clamped directly through the gusset plates, doing away with the



Oakland Model 38 Speedster, Showing Roomy Two-Passenger Seat and Flat Rear Deck for Tires.

overhanging brackets, which are heavy and cause an additional strain on the cross member. In the Oakland construction the body is support-



Dash of the Oakland Model 38, in Which an Excellent Assembly of Controls Is Seen.

ed by the side panels throughout its entire length without overhang, thus eliminating the necessity of using side aprons on the car, and giving a rigid support to the body.

This year the brakes have been improved by reductions in weight and simplification of construction. Oakland rocker bearings, which require no oiling or attention, are used on the brake operating system and the gear shift lever. This device, controlled exclusively by the Oakland company, reduces the labor necessary in the proper care of the chassis. Every grease cup on the Oakland can be reached from the side of the car.

The model 28 roadster has a roomy two-passenger body, entirely decked over in the rear, and contains a large baggage and tire compartment. A panel door at the extreme rear of the body gives access to this compartment.

The speedster is mounted on the same chassis. The sides of the driving compartment are exceptionally low and the after deck is flat. Two large bucket seats, raised about eight inches from the floor of the car, provide unusual comfort. Spare tires are carried flat on the after deck. This car has a higher gear ratio than the others and is said

to attain a speed of about 60 miles an hour.

The touring body has been made higher and wider this year. All cars of this model are equipped with left side drive and centre control.

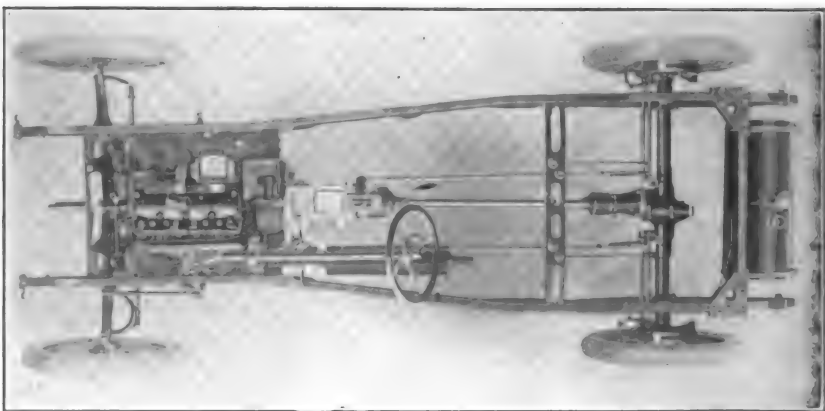
The equipment includes electric headlights with dimmer attachment, electric tail and shroud lights, one-man top, full set of tools, license tag brackets, electric horn, tire irons with extra demountable rim, non-skid tires on the rear and a gasoline gauge.

GASOLINE FROM NATURAL GAS.

The United States Bureau of Mines has issued a bulletin dealing with the condensation of gasoline from natural gas, a method that is now in use in many of the oil fields of the country. The process offers the oil well operator a means of preventing the waste of a large volume of gas that is produced along with the oil.

The production of oil is not hindered, gasoline of high value is secured, and, after that element has been removed the gas may be piped back into the fields to run the pumps or it may be turned into pipes from which gas fuel is drawn for other purposes. The removal of the gasoline does not greatly effect the value of the gas for fuel purposes.

The quantity of natural gas that becomes available when a new oil well is drilled may be 10,000,000 to 15,000,000 feet at first, though the flow later diminishes. It has been the practise in the past to use this gas for pumping on the leased area, or perhaps for lighting and heating a few of the buildings in the immediate vicinity. The balance has been wasted. The gasoline condensing plant prevents this great waste and produces an excellent quality of gasoline.



Top View of Oakland Model 38 Chassis, Showing Tapering Frame and Underlung Rear Springs.

SUGGESTIONS FOR THE FORD CAR OWNERS.

The General Characteristics of the Design of the Unit Power Plant That Make for Simplification, Accessibility, Strength and Light Weight.

The 24th article dealing with the construction, operation, maintenance, care and repair of the model T Ford chassis is devoted to the consideration of the components and design of the unit power plant, and the general simplification of the engine assembly is detailed.

MANY factors have been considered in the designing of the motor of the model T Ford chassis. Among these are practicality, operating economy, endurance, power production, simplicity, accessibility from the viewpoint of utility, and manufacturing economies from the viewpoint of the manufacturer. The Ford motor has been gradually developed by experience, but the improvement has caused no radical changes in the engine since the first was produced, which is sufficient evidence of the care and thought given to the original designing. No claim is made that the motor is superior to others, but the statement is made by the manufacturer that it is intensely practical, and as more of them are in use than any other engine ever produced, the inevitable conclusion must be that there has been greater experience and more extensive knowledge with these machines than any other type used for vehicle propulsion.

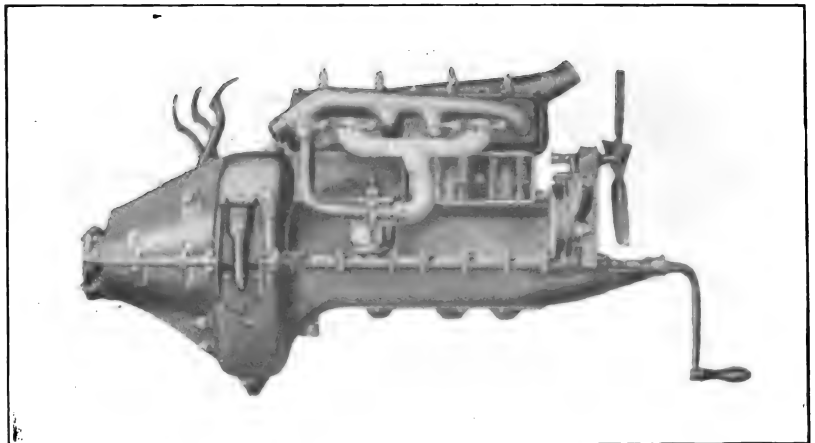
Production economy has impelled certain features of design, because the manufacturing processes have been standardized, and each motor is theoretically at least in duplicate of all others. In practical operation there is so little variance that uniformity of efficiency and usefulness can consistently be expected of them. The motor differs with usual four-cylinder types in that it is made of five units, these including the cylinder block, the motor head, the motor base, the timing gearset housing and the transmission gearset housing, with, of course, the crankshaft, the camshaft, the pistons, connecting rods and the gearset assemblies.

Cylinders Cast En Bloc.

The cylinders are cast in a unit or block, with the water jackets integral, this construction

making for simplicity and rigidity, greatly lessening the work of assembling and insuring that the relations of the different components will be the better preserved during service. The design of the cylinder block is not unconventional, but it is a type that is not generally used, for with the block is cast the upper half of the crankcase. Were the cylinders each cast separately, or in pairs, the crankcase would necessarily be in two pieces, upper and lower sections, or be what is known as the barrel type with a base plate fitted to the main portion of the case.

The Ford cylinder block is designed with the upper half of the crankcase integral, this construction obviating considerable machine work



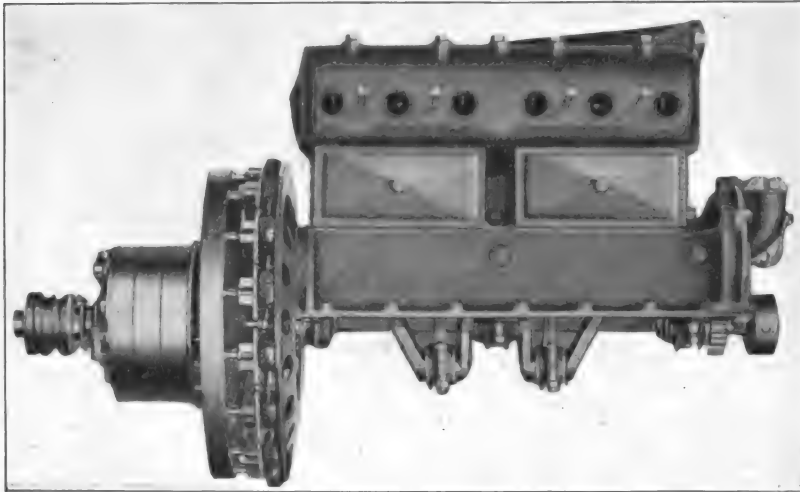
The Full Assembly of the Unit Power Plant of the Model T Ford Chassis, Showing the Valve or Right Side.

and assembling, and insuring the relations of the cylinder block with reference to the crankcase, a quality that is of material importance when one realizes that the engines are operated by those who have but little mechanical knowledge, and who are seldom qualified to make careful adjustments and obtain the precise relations that must of necessity obtain to insure satisfactory operation. The form of the cylinder block is shown in an accompanying illustration, but in this it is assembled with the valve cover plates and the head, as well as the crankshaft, flywheel, magneto and transmission gearset. The cylinder block is cast with the water jackets extending from the top to

about the upper line of the valve cover plates, the lower section of the cylinders having single walls that are never so heated that they cannot be cooled by the circulation of air about the engine.

Cylinders Cast Without Heads.

The block is designed to contain all but 5/16 inch of the cylinder length, so that the cylinder is in effect a tube through the casting. In all the processes, from the foundry to the final machining, this construction makes for simplification and uniformity of the work. Casting the upper section of the crankcase with the cylinder block insures a greater rigidity than were they separate, and there is a strong central transverse web across the crankcase section, between the second and third cylinders, that carries the centre main bearing. The casting is made with lib-



The Cylinder Block of the Model T Ford Motor with the Crankshaft, Fly-wheel, Magneto and Transmission Gearset.

eral lower flanges, which are reinforced by bosses for the bolt holes, and side and centre webs under the valve pockets. The water passages in the cylinder jackets are large and the design is such that these can be easily cleared, to insure a free circulation in the cooling system.

The top of the cylinder casting has in it the four cylinder bores, the eight valve seats and the openings of the water jackets, and the form is such that these can be easily and uniformly machined. The cylinder head is a separate cored casting, into which the combustion heads of the cylinders are recessed, and these are such form as to include the valve pockets, with the openings for the spark plugs directly over the inlet valves. The top of the casting is formed as a channel, which extends practically the length of the casting, so that in this there will be a directed move-

ment of the water toward the outlet from each cylinder rather than a diffusion of the water generally.

Gasket Makes Perfect Connection.

This head is applied with a copper asbestos gasket that makes a water and gas tight connection, this gasket being shaped to conform to the openings in the cylinder block and head. The head itself is secured with a series of cap screws that are seated in the cylinder casting and by which pressure can be uniformly obtained. The pistons, when the motor is assembled, extend into the head approximately a quarter inch, this allowing for the gasket. Without the head or gasket the extreme upward movement of the piston will bring the piston head 5/16 inch above the top of the cylinder casting.

The base of the engine is a section pressed from plate steel that extends the full length of the power plant. The forward end of this carries the support for the cranking handle, and the rear forms the housing for the flywheel and the transmission gearset, the extreme rear end supporting the clutch shaft and the universal joint at the forward end of the driving shaft. This case is formed with flanges that are bolted to the flanges of the cylinder casting, but it does not support weight, the crankshaft, camshaft, timing gearset, flywheel and transmission gearset being carried by the cylinder casting. The housing, however, greatly strengthens the assembly, giving the cylinder block greater

rigidity, and yet it is decidedly lighter than a casting.

Base Plate Contains Oil Troughs.

An opening is cut through the bottom of this housing, which is closed by a pressed steel plate retained by cap screws. The base housing serves as an oil reservoir, and should there be occasion to examine or work on the main or connecting rod bearings, these can be reached by removing the plate. This plate is formed with three transverse pits or troughs in it, and with a ridge or ring about it. The purpose of this ridge is to retain the oil in the troughs in the event that the car is on a gradient, for the big ends of the three forward connecting rods sweep into these and the distribution of the lubricant throughout the engine is by splash. These plate troughs are not deep, for the purpose is not to have extreme

depth of oil. Attached to either side of the bell of the housing that encloses the flywheel is a bracket that supports the power plant on the side members of the chassis frame.

The upper rear section of the motor case is in two parts, these being formed of pressed steel. The one of these is the housing and the other a cover plate that is removable when occasion requires the adjustment of the clutch and the bands of the transmission gearset. The main part of this section is belled to enclose the upper half of the flywheel and the gearset, and it is bolted to the lower half of the housing. The forward end of the crankcase base and the timing gearset are enclosed by a cover plate that is bolted to the cylinder block. This plate meets a web formed in the crankcase base and an extension of the base carries the bearing for the starting crank. On the crankshaft end is mounted a pulley by which the fan belt is driven.

Light Weight for the Power.

This assembly affords a unit power plant that is comparatively light for the power developed, is particularly strong and enduring, has sufficient factors of safety to more than meet any requirements that may be made in passenger car service, and is so greatly simplified that the care and attention necessary is minimized. The engine is normally rated at 22½ horsepower by the formula of the Society of Automobile Engineers, but it will develop considerably in excess of this rating when normally efficient. The Ford model T car weighs approximately 1100 pounds, so that there is roughly one horsepower for each 50 pounds of chassis weight.

The simplicity of the engine is striking and is such that the care and attention is minimized, which is a very important factor in the event that the owner cares for the machines, for less labor and fewer adjustments are necessary to keep it in operative condition. The operating parts are all enclosed and protected from water, dust and abrasives, and the provisions made for lubrication are adequate. To illustrate, the construction of the engine insures full access to the combustion and expansion chambers and the valve pockets and the valves by removing the head of the cylinder block; the main bearings and connecting rod bearings can be reached by the removal of the bottom plate of the crankcase; the flywheel, magneto and the transmission gearset are accessible by taking off an inspection plate for ordinary adjustments, and the timing gearset can be examined by taking out the bolts that retain the cover plate.

(To Be Continued.)

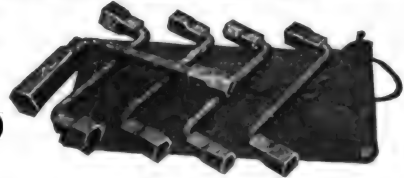
Mossberg Guaranteed SMALL CAR TOOLS

O
S
S
B
E
R
G
.
G
U
A
R
A
N
T
E
E
D
.
T
O
O
L
S



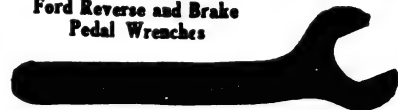
No. 30
Socket
Wrench
Set
\$4.00
Complete

An ideal
set for
light car
users
\$2.00



Small Car Socket Wrench Set No. 17
Ford Reverse and Brake
Pedal Wrenches

12c
Single End



S. E. Reverse Brake and Cylinder Head Wrench No. 640
Ratchet Reverse Wrench

50c
Best
Adapted



Ratchet Reverse Brake Pedal and Tension Spring
Wrench No. 645, No. 7454.

The "Old Necessary"

10c

Ford Hub Cap
Wrench No. 650



Kit Wrench for FORD and Metz

16c



Triple End Cylinder Head and Housing
Wrench No. 630

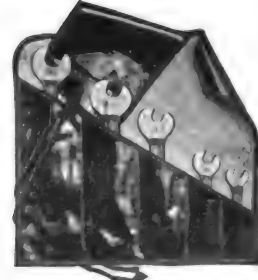
Almost indispensable on cylinder head and Axle
Housing Nuts because the sockets are tapered 26c



25c

Valve Grinder
for Ford

The Logical Valve
Grinder



FORD
Engineer's Set \$1.00

FRANK MOSSBERG CO.
ATTLEBORO, MASS.

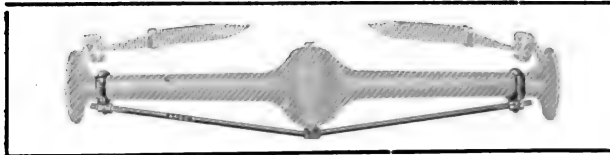
If your dealer cannot supply you, we will ship prepaid on
receipt of price. Send for Catalogue No. 171 E.

FORD CAR ACCESSORIES AND EQUIPMENT.

APCO REAR AXLE TRUSS.

Designed for Equipping Ford Cars Made Prior to 1915,
It Can Be Quickly Attached.

The Auto Parts Company, Providence, R. I. is manufacturing a new rear axle truss for Ford cars made pre-



Apco Rear Axle Truss.

vious to the current year. A feature of the truss is that it does not impose any strain on the axle tubes, as the clamps securing the truss are attached to the reinforced ends of the axle housings. The truss has a cradle which fits under the differential case, and the cradle has square sockets to take the square heads that are made integral with the rods. In the clamps is a square recess, so that the bolts are flush with the surface. This truss is adjustable and can be attached in 10 minutes. The cost is \$1.50.

QUICK DETACHABLE TRANSMISSION BAND.

Quick Detachable Transmission Bands for Ford Cars,
with Several Exceptional Features.

The transmission of a Ford car is operated by the appliance of bands which pass around the outside of the transmission drums. These bands are subject to wear



Gemco Quick Detachable Transmission Band.

heavy spring steel and lined with the best brake lining procurable. There are two drop forged ears, one of

and in time they will become so worn that it will be found necessary to replace them. The bands commonly used on the Ford are very difficult to detach, it frequently being necessary to disassemble and reassemble the transmission case. This is necessary because the ear of the band catches on the sides of the transmission case. The Gemco Manufacturing Company, Milwaukee, Wis., maker of the well known Gemco specialties for automobiles, is now producing a quick detachable transmission band for Ford cars. A feature of the band is that one of the ears is detachable, which allows of the band being taken out without having to disassemble the case, except to remove the small cover at the top. It is claimed that by this method any one of the bands may be removed and replaced in 10 minutes. The Gemco quick detachable bands are made of

which, as already stated, can be detached in less than a minute while the other ear is firmly riveted to the band. The accompanying illustration shows the manner in which the bands can be inserted. It is only necessary to remove the detachable ear and pass that end of the band around the transmission drum and then replace the ear and attach to the car in the usual manner. These bands are generally sold in sets of four, thus giving an extra band for an emergency roadside change. Worm bands can be easily relined. The Gemco quick detachable band with lining attached is retailed at \$1.50 each, and for \$1 additional the company will supply enough lining and rivets for three bands.

MOSSBERG TOOLS FOR FORD CARS.

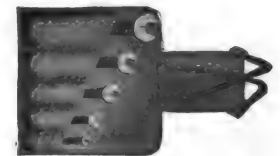
Widely Known Manufacturer of Mossberg Wrenches and
Specialties Makes Special Set for Model "T" Ford.

Among the many wrenches and specialties produced by the Frank Mossberg Company, Attleboro, Mass., are sets of master tools that are said to meet all the requirements of the model "T" Ford car, which has many bolts and nuts that are inaccessible to the ordinary wrenches. The wrenches illustrated show some of the products of the company. One of these is a ratchet wrench designed especially for the reverse and brake tension springs, which the maker states saves at least 30 minutes in the adjustment of these components over the ordinary methods. Another is a thin goose neck, having a plain open end, which is used on the reverse spring. It is known as No. 640.

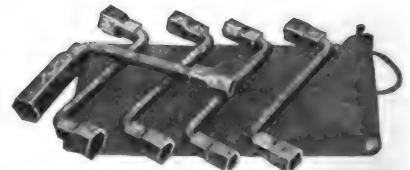
A set of engineers' wrenches, designated by the manufacturer as the No. 10 set, consists of five thin wrenches, each of which has two openings of varying sizes. These are shown in an accompanying illustration. These wrenches are thoroughly hardened and neatly finished, and are sold in the case shown.

Another useful wrench set that should be especially valuable to the owner or repair man, is the illustrated set of 10 socket wrenches. These have both hexagon and square openings and tools for the 1915 model main bearings and nuts of the Ford machine. A spark plug socket wrench is included in the set, which is sold in a canvas case. Another handy tool is the cylinder head nut wrench.

All Mossberg tools are sold with the usual Mossberg guarantee and at a comparatively low price.



Engineers' Set, No. 10.



Socket Wrench Set, No. 17.



Cylinder Head Wrench, No. 630.



Reverse Goose Neck, No. 640.



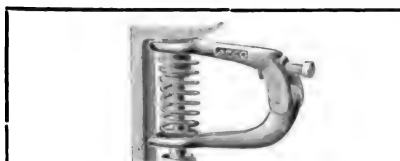
Reverse and Brake Wrench, No. 645.

APCO SPECIALTIES.

Well Known Manufacturer of Accessories Has Improved Several Ford Specialties.

The Auto Parts Company, Providence, R. I., is producing several improved Apco specialties which have distinct practical features and are sold at low price. The improved clutch release illustrated is now constructed with a chain which permits easy and rapid installation. It affords a perfect and convenient control of the clutch, in that a slight pressure upon the foot pedal instantly disengages the member. Installation can be accomplished in about 10 minutes. The complete equipment is listed at 50 cents.

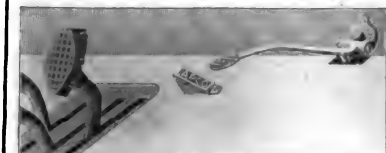
The Apco accelerator, as shown herewith, has been greatly improved.



Apco Valve Spring Remover.



Improved Apco Clutch Release.



Improved Apco Accelerator for Ford Cars.

screw driver. It is made of black enamelled semi-steel, and is retailed at 25 cents.

"SITSTIL" FORD CRANKER.

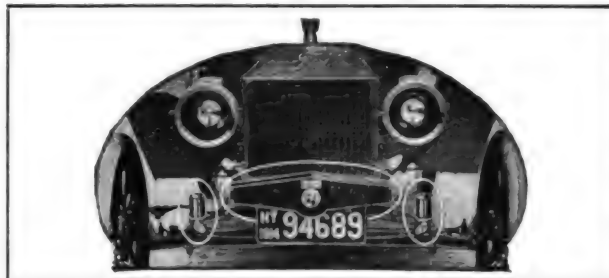
A Mechanical Starter, Operated by a Foot Lever, That Takes the Place of the Hand Crank on Fords.

The "Sitstil" cranker is the significant name of a mechanical starter which the Troy Auto Specialty Company, Troy, N. Y., is manufacturing for Ford cars, as one of the features of its large number of automobile specialties. The starter engages the engine in the same manner as the hand starter, and is attached by placing it in the same position as the hand crank when the latter is removed. The accompanying illustration shows its position. A feature of the starter is that by removing a small cap at the front of the case, the hand crank can be used. The "Sitstil" is operated from the seat by a foot lever, hence its name, the lever being attached to the frame in a position convenient to the other pedals.

The starter is designed for service, which it renders very satisfactorily. All working parts are thoroughly hardened, and those parts exposed to view are ornamentally finished. Installation is a comparatively simple matter for any individual and can be accomplished

very quickly, without marring the finish or appearance of the car.

The price of the "Sitstil" cranker complete, including



"Sitstil" Cranker Installed on a Ford Car.

a seat priming attachment, is \$15. It is sold with the guarantee that if it is not found satisfactory after 10 days' trial, it can be returned and the purchase price will be refunded. Inquirers will receive prompt answers if the Automobile Journal is mentioned when writing.

FORD CAR IGNITION CABLE.

Special Equipment to Insure Against the Failures Resulting from Poorly Protected Wiring Systems.

The Packard Electric Company, Warren, O., which has for years been one of the best known manufacturers of high quality electric wire and cable, is now producing sets of ignition cable that are cut and fitted with terminals and are ready for instant installation in Ford cars. This equipment is made up of two series of cable for each set, the one being the low-tension and the other the high-tension connections. The low-tension wiring is of high-grade automobile cable, each lead with a distinctive color to facilitate installing, and each cable is coated with Packard flexible enamel so as to be heat, oil and water proof. The high-tension cable is specially constructed to carry heavy loads, the wiring being insulated with a superior quality of rubber covered with two substantial braids and many coats of Packard flexible enamel. Each cable is cut to the necessary length and the dash end is fitted with a strong terminal ring and the plug end with a convenient slip terminal.

EMERGENCY BRAKE SHOES FOR FORD CARS.

Illinois Manufacturer Makes a Very Efficient Emergency Brake Shoe for Ford Cars.

The emergency brake shoe illustrated is the product of the W. H. Howell Company, Geneva, Ill., which also is the producer of the widely known and used Jensen lever tire pump and other accessories for Ford cars. The brake shoe is one of the fastest selling articles the company has for distribution, and is meeting the requirements of thousands of car owners in all parts of the country.

These emergency brake shoes are said to be more enduring than the ordinary type, the manufacturer stating that they will last five times longer. The brakes are fitted with an asbestos lining, and are shipped from the factory complete and ready to attach. In addition to its endurance, the brake is stated to give more reliable service in braking operations. The price of this brake is \$1.25 a set.



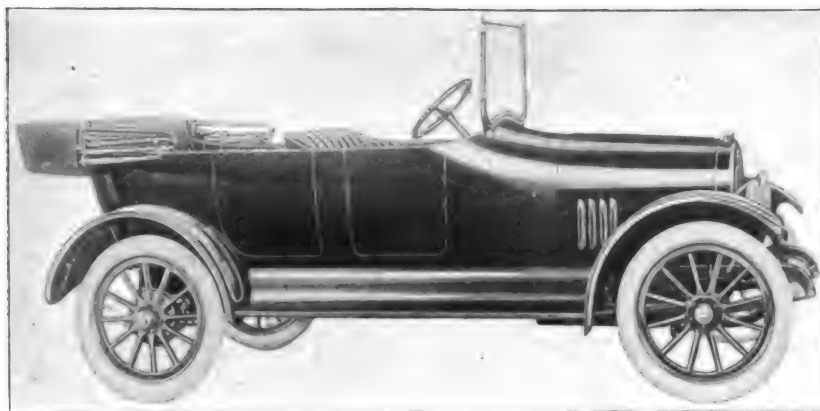
Howell Emergency Brake Shoe.

NEW CAR OWNERS DEPARTMENT.

Two Low-Priced Dort Models—Readers' Queries—Suggestions as to Maintenance, Repairs and Operation.

AN ACTIVE manufacturing experience of 28 years and a careful study of the requirements of the great majority of motorists are re-

stroke of four inches, being rated at 16.9 and 14.4 horsepower by the S. A. E. formula. The motors are practically the same in design, but differ in dimensions and proportions. The engines are four-cylinder, four-cycle, water cooled, L head types, with the cylinders cast en bloc, and are very carefully built. They have abundant power and are extremely efficient in operation. The power plants are mounted at three points.

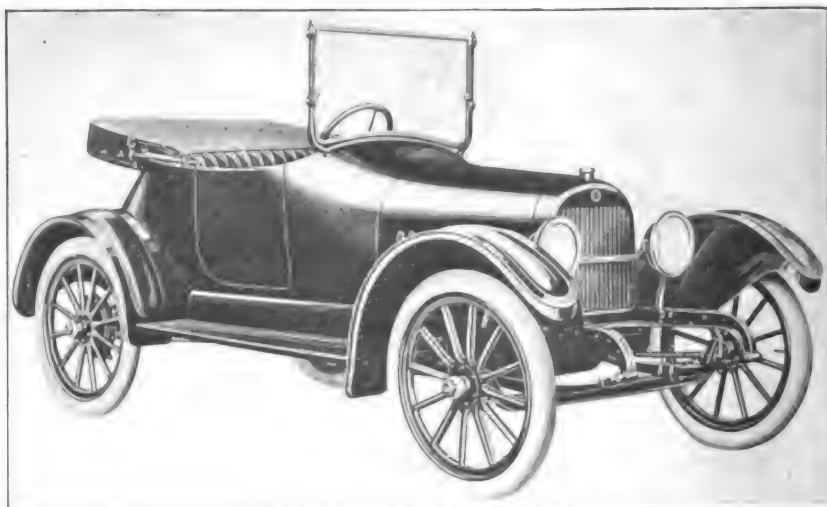


Dort Five-Passenger Touring Car, Model Five.

flected in the two models of low priced pleasure cars built by the Dort Motor Car Company, Flint, Mich., which are regarded as being exceptional value for the prices for which they are sold. One of these machines is a five-passenger touring car and the other is a two-passenger roadster. These have been designed to meet the demands of those who desire economical and enduring vehicles, which are light in weight, substantial in construction, and efficient in whatever use may be made of them. Strength has been obtained by careful selection of metals and sufficient factors of safety have been provided.

The touring car, which is designated as model five, and the roadster, known as model four, are sold for \$680 and \$495 respectively. The chassis in general detail of construction, aside from the power plants, are the same, but the engine of the model five has bore of 3½ inches and stroke of five inches, and the motor of model four has bore of three inches and

pressure upon the cylinders. Lubrication is by a circulating splash system, the lower half of the crankcase having four small wells, that are constantly supplied with oil by pump operated off the camshaft. The cooling is by a thermo-siphon system of water circulation through a tube and fin radiator. The battery type of ignition is provided, the battery being of Connecticut make. The carburetor is an automatic float feed type,



Dort Four-Cylinder, Two-Passenger Roadster Model Four.

Saves Washing Car
S. C. JOHNSON & SON,
Racine, Wis.

Gentlemen: In answer to your letter of the 24th, I had a hard time to get my boss to try the Wax on a new car he has to demonstrate with, but landed him and now he will not use anything else. He thinks it is great. It has saved me washing the car every day. Once a week or once in two weeks will keep the car looking like new. It is great stuff believe me. I take great pains in showing it up.

Yours very truly,
K. PAUL,
Schenectady, N. Y.
25 Elm St.

Thought Car Was Repainted
S. C. JOHNSON & SON,
Racine, Wis.

Dear Sirs: I must tell you a little experience I had the other day. An auto came in to be washed: it was so covered with mud you could not see the auto. I washed it and polished it with Johnson's Wax; the man came back after driving around the city, said everyone thought his car had been repainted.

Yours truly,
A. H. BRILL,
Hastings, Mich.

What Kept Car So Nice?
S. C. JOHNSON & SON,
Racine, Wisconsin.

Gentlemen: We used the Wax on the auto and had several inquiries regarding the shine. One man, a stranger, called up by phone, asking what we used to keep the car looking so nice. He is now a user of Johnson's Wax also.

Yours truly,
E. F. LINGQUIST,
Logansport, Ind.

Leaves Hard, Dry Surface
S. C. JOHNSON & SON,
Racine, Wisconsin.

Gentlemen: I have never used anything that anywhere near equals Johnson's Prepared Wax for giving a high gloss that will turn rain and dust.

All polishes that I have ever used before leave such an oily surface that the body will collect more dust after using it than before, but your Wax leaves such a hard, dry, as well as glossy surface that dirt does not stick to it, and for the first time I can now polish my car without getting my hands all over grease and oil and musing things up generally.

Yours very truly,
B. F. SAWIN,
Chicago, Ill.

What Motorists say about

JOHNSON'S PREPARED WAX

—is that it is a dust-proof, water-proof, mud-proof and sun-proof polish for motor cars, which gives a hard, dry, glossy finish that lasts. Users say Johnson's Prepared Wax is unequalled. Judge for yourself. Send for sample can.

S. C. JOHNSON & SON
RACINE Dept. AJ4 WISCONSIN

Makes Car Easy to Clean

Gentlemen: Upon the arrival of your sample can I had the Wax applied to my car in light coats. Each coat was allowed to dry well and then well rubbed before the application of the next. After the third coat the varnish seemed to me to have acquired a gloss of greater depth and the car looked as well as when new. After a few rain storms I had the car washed clean of the mud acquired and was more than pleased to find the car still bright without the application of another coat of Wax. An occasional coat of wax has kept the car looking well and easy to clean during our rainy and muddy winter.

Very truly yours,
ERNEST O. BILLWILLER,

Best He Ever Used
S. C. JOHNSON & SON,
Racine, Wis.

Gentlemen: I must say that Johnson's Prepared Wax is the best material that I have ever seen or used for this work and have recommended it to several, who I know are also using same with as good results as I am having myself.

Very truly yours,
R. M. LAING,
Perth Amboy, N. J.

Is Indispensable
J. C. JOHNSON & SON,
Racine, Wis.

Dear Sirs: Have used the sample which you sent me and find that it is the best polish I have used on an automobile. It keeps its lustre and improves the looks of the machine 100%.

I will keep a can on hand as it is indispensable.
Yours truly,
H. L. MOOREHOUSE,
83 Liberty St.,
Danbury, Conn.

A Hard Polish—That Collects No Dust
S. C. JOHNSON & SON,
Racine, Wis.

Gentlemen: I find that Johnson's Prepared Wax is a very fine preparation to use on automobile bodies. The wax does not collect dust like most body polish. I find that it retains its hardness under this southern sun. The car I used this polish on had lost its original gloss. After applying one coat of the Wax the finish looked like new. Johnson's Prepared Wax is the best polish that I know of for auto bodies. I remain

Yours truly,
JOHN BARON, JR.,
El Centro, Calif.



Send us 10c for a can of Johnson's Prepared Wax—sufficient for one application on a large car.

USE THIS COUPON

S. C. JOHNSON & SON
RACINE, WISCONSIN

I enclose 10c for a can of Johnson's Prepared Wax—sufficient for one polish on a large car.

Name.....

Address.....

City & State.....

My accessory dealer is..... AJ4

the gasoline being supplied from a tank located under the cowl.

The clutch is a leather-faced, pressed steel cone, 12 inches diameter, with $2\frac{3}{8}$ -inch face. The transmission gearset is the three-speed selective type. The power is transmitted by a large chrome nickel steel shaft, in which is a single Spicer universal joint, to the rear axle. The rear axles differ in these chassis, that of the touring car being a three-quarter floating type, and that of the roadster being a semi-floating axle. Hyatt high duty roller bearings are fitted in the differential assemblies of both chassis. The brakes are internal expanding and external contracting on rear wheel drums, and are 10 inches diameter. The wheels are an artillery type, have 12 spokes each, and as standard have clincher rims. The tires on the touring car are 30 by $3\frac{1}{2}$ inches, and on the roadster, 30 by three inches; the wheel-base is 105 inches and 92 inches, respectively. Semi-elliptic springs are fitted on the front axles, and full cantilever suspension is used at the rear.

Sixteen-inch steering wheels are located at the left sides of the chassis, and the steering gears are irreversible worm and nut types. There is ample leg room in both models.

Standard equipment of the touring car includes electric generator, lights and horn, one-man top, windshield, speedometer and complete tool equipment, but for the roadster if a speedometer is ordered, an additional charge of \$10 is made for the instrument. Electric starters will also be supplied at an additional cost of \$45 for either model, and additional charges of \$15 will be made for demountable rims and a tire carrier.

Both cars are amply powered, sturdily built and commodious. The cushions are deep and afford extreme riding comfort for the passengers. In the roadster there is a large carrying compartment in the rear for the storage of parcels and luggage.

READERS' QUERIES.

Suggestions to Owners---How to Lock Automobiles, How to Set a Timer, the Proper Method of Peining Piston Rings, and Overcoming Heating of the Engine.

Locking an Automobile—D. McW., Tampa, Fla.

Will you describe any practical means for locking a car so that it cannot be driven without the owner's consent? Recently a number of automobiles have been stolen in this vicinity and I am desirous of locking my six-cylinder touring car when left without attention. Is there any objection to the locking devices now in the market?

So many motor car locks are in the market the writer cannot describe or comment on them, but from the following statements of principles you may judge the merits of some of them. Among the earlier devices to prevent unauthorized use of cars were locks for the coil switches. Most of these, however, were found inadequate, as the coil could be wired around or a duplicate key inserted in the switch. The gasoline may be shut off at the tank, a method that is effectual against novices, but it is no protection from the experienced automobile thief.

The most effectual lock is a device that will secure the emergency brake lever in the extreme position, at which point not only will the clutch be disengaged, but the wheels will be securely locked, thus preventing the car being either driven or towed away. Another insurance against theft would be locking the steering gear in either extreme position. Still another means would be to lock the gear shifting lever either in neutral or in reverse. This can be done by drilling a hole in the quadrant to take the hasp of a reliable padlock. If the car is started by cranking, it is possible to place the handle in mesh with the crankshaft and then fasten it by a chain and lock to the front axle. Many drivers lock the gas and spark levers, but if there is a foot throttle, the locking will be useless. All the above means will serve useful purposes to prevent theft by inexperienced thieves, but cannot be regarded as insurance against the men who know cars and can with hand tools remove the locks in comparatively short time.

Timing a Mitchell Light Six—Attleboro, Mass.

Can you tell me through your journal how to time a Mitchell light six (1915), after having chains and distributor off?

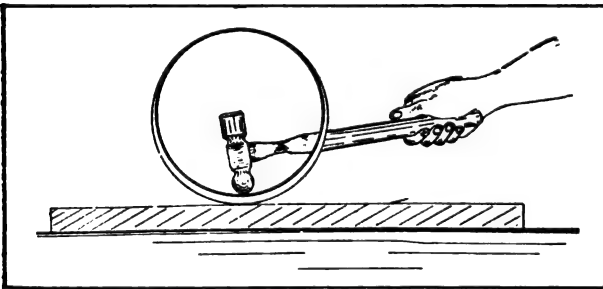
The engine should be turned over by hand until the piston of No. 1 cylinder comes up on its compression stroke. Stop when the 1-6 mark on the flywheel has registered with the indicator. At this point the piston is at the uppermost point of compression, or as commonly termed, dead centre. The compression stroke of No. 1 cylinder can always be determined by opening the relief cock and holding a finger over the opening. The spark lever on the steering wheel should now be advanced about quarter way. Remove the distributor cap and set the combination breaker and distributor on the driving shaft with the set screws loose and then connect the advancing lever. The hub should now be turned on the shaft in the direction of rotation until the contact points are just opening (which is the point at which the spark takes place), and the

hub set screws should be securely tightened. Replace the distributor cap, carefully noticing which segment of the distributor the brush is opposite, as this is the connection to No. 1 spark plug. The balance of the plugs should then be connected in their proper firing order, which is 1-5-3-6-2-4.

Peining Platon Rings—H. T. G., Burlington, Vt.

I have read considerable about restoring the elasticity of piston rings by peining them. Will you state through your columns how this is accomplished? I have a small engine which does not develop the power and I can hear the compression leaking by the piston rings.

The cost of new piston rings is very small and it is advisable to install these in preference to renovating the old. Peining is an operation which must be performed with much care to insure satisfactory results. The ring is placed on a smooth iron surface, usually an old surface plate, and then hammered lightly and evenly on the entire inner surface with the ball end of a machinist's hammer. The effect of this operation tends to flatten the surface of the metal and thereby lengthen the ring, which, of course, ex-



Illustrating the Proper Method of Peining Platon Ring.

pands and fits the bore of the cylinder tighter. Great care must be taken in hammering the ring, as it is eccentric in shape and, being made of cast iron, is very brittle, and it will snap if too hard a blow is struck.

Water Boils Quickly—J. L. Q., Providence, R. I.

A few weeks ago I received my roadster back from a local repair man after he had given it a thorough overhauling and had fitted it with many new parts. A condition has materialized which causes me much annoyance and which was not evident before the car was sent to the repair shop. The cooling water boils quickly and the motor becomes very hot after it has been run a few minutes. Local repairmen have not solved the difficulty and one suggests that the car is stiff and will limber up in a little while. Continued use has not caused improvement. I would appreciate any suggestion which may be helpful.

A possible cause for the motor overheating may be excessive friction in the cylinders, which may be the result of many conditions. Any engine will be stiff for a few days after an overhauling, as the different parts have been closely fitted. If new piston rings have been used in your en-

(When Writing to Advertisers Please Mention The Automobile Journal.)



"Don't Gamble with Safety"

(IMPROVED)



Broad claims are made for some brands of lining—BUT the improved S-M-C Asbestos Brake Lining is made of selected long fibre asbestos and brass wire, both fireproof and indestructible material, woven on special looms, treated with a special compound, giving it the same coefficient until worn out. Heat, water, oil or gasoline will not effect it.

The S-M-C Asbestos Brake Lining is the standard set for all good linings, and only its qualities insure the highest brake efficiency. This means safety, economy and long service.

S-M-C is made for every service and in all widths and thicknesses. Sold with a guarantee of giving the highest degree of satisfaction or the purchase price refunded with interest.

NEW UNIVERSAL Ford Transmission Lining

A special quality for lining the transmission band on Ford cars. It has extreme endurance and obviates all transmission troubles. Sold with rivets ready to attach.

A special demonstration price of \$5.50 the set will be extended the trade for the next 30 days.

DEALERS—Write for the S-M-C big profit selling proposition—It is one kind that will interest you.

"SOMETHING MOR'N COTTON."

STAYBESTOS MFG. CO.

Germantown, Philadelphia, Pa.

Makers of

Asbestos and Rubber Packings, Gaskets and Radiator Hose



The illustration shows a large sack of money with a Pyrene fire extinguisher placed inside it. To the right of the sack, the word "Pyrene" is written in a large, stylized script font, with "TRADE MARK" in smaller letters below it. Below "Pyrene" are the words "FIRE EXTINGUISHER" in bold, block letters. Underneath that, "SAVES 15%" is written in large, bold letters. A rectangular box contains the following text:

Because the underwriters KNOW its efficiency, a Pyrene Fire Extinguisher on any car will save 15 per cent. of the fire insurance cost.

It will save loss of car service and protects life and property. Instantly available.

Small Light Convenient

The Pyrene Company of New England
88 Broad Street, Boston, Mass.

gine these may not have been correctly fitted to the cylinders and they bind and cause excessive friction.

I would suggest that you first increase the oil supply until the car smokes and continue to run with plenty of lubricant for several days. If no improvement is noted, the engine should be taken down and the parts carefully measured to determine whether any are larger than they should be, or if there are any that are fitted too tightly. Some times in overhauling a motor wrong components are assembled. That is, the piston of one cylinder may be inserted in another cylinder, and as pistons vary in dimensions, this would probably cause excessive friction and heat.

The valves may be improperly timed or the gas mixture may be too rich, the latter frequently being the cause of such trouble. One suggestion is that you determine that the radiator is clear and that the water is circulating freely. If the motor is taken down you should determine whether or not there is a true alignment between the crankshaft and the pistons. No doubt the hard starting is caused by the stiffness of the working components.

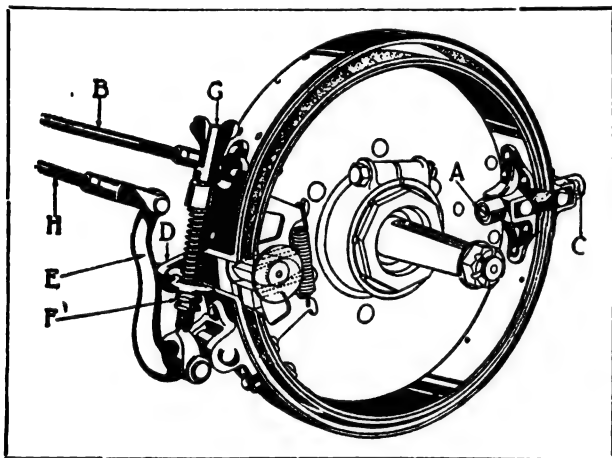
(When Writing to Advertisers Please Mention The Automobile Journal.)

TEACHING THE NOVICE DRIVER.

The man learning to drive can gain confidence and better control of his car if a broad highway or parkway that is unfrequented by traffic is selected for the lessons. Plenty of room should always be sought so that until he has a reasonable knowledge of driving there need be no serious results from mistakes. When there is ample room the beginner will have a chance to drive without possibility of confusion and will quickly learn the exact effect of the uses of the different levers and pedals. The car should always be driven slowly until the operator has thoroughly familiarized himself with the stopping of it. This caution is given as the operator may feel that he is proficient in the control of the car and should it be moving at a good rate of speed, an unforeseen condition may eventuate and so confuse the operator that an accident may happen. Such an exigency may prove disastrous to the operator, as well as to the machine. The beginner should always remember that the emergency brake will stop the car without having to feel around for foot pedals, and that the brake is always ready for use.

ADJUSTMENT OF BRAKES.

The brakes of an automobile are of vital importance to the machine and they should be kept well adjusted. The accompanying illustration shows the internal brake of the expanding type, which expands against the inside of the brake drum on the rear wheels. In adjusting this type it is necessary to see that the screw "A" is loosened, so that there is a clearance of 1-64 of an inch between the brake drum and the band. Next, the brake rod "B" should be disconnected from the cam lever. With the emergency lever released and the wheel raised off the floor, next grasp the cam lever with the hand and draw it forward until it locks the wheel, and then release the lever slightly until the wheel revolves freely. At this point the adjustment should be



External and Internal Brakes, Showing Their Operating Parts.

made on the rod, by screwing up on it until the hole in the lever and the hole in the rod register. This adjustment should be made on both rear wheels, care being taken to determine that both wheels are receiving equal pressure, which can be ascertained by applying the brake hand lever a notch at a time. As these brakes are not equipped with equalizers, any variation can be adjusted by taking up or letting out on the clevises at the ends of the rods "B."

The contracting type of brake applies the pressure to the outer surface of the brake drum. In adjusting these it is necessary to disconnect the brake rod "H" from the lever "E," thus allowing the lever "E" to fall back on the bracket "D." The band should then be spaced about 1-64 of an inch away from the brake drum, which is done by turning one way or the other on the screw "C" on the rear anchor bracket. After the required clearance is reached at this point it

(When Writing to Advertisers Please Mention The Automobile Journal.)

HOTEL LONGACRE

Broadway & 47th Street

More Like a Club Than a Hotel
Exclusively Bachelor

Convenient to Everything. The refined air and good service of a club.

RATES PER DAY

50 rooms with lavatory...\$1.00

150 rooms with private bath 1.50

50 rooms with private bath 2.00

Two-room Suites, \$3.00 to \$4.00

Special Weekly Rates

Restaurant a la carte.

Club Breakfasts.

Dining room Open to Ladies.

The best value in New York City
both in rooms and restaurant.

Phone, 7790—Bryant

J. G. BOGGS.

Write for full
particulars



Why Freeze Yourself?
Ruin Your Auto?

The Superior
Safe Garage Heater

SAFE. NO FUMES.
NO GASES

Equipped with pilot light. No
matches, no danger, no discomfort.
An ideal positive heater.

SUPERIOR MANUFACTURING CO.

N. S. Pittsburgh, Pa.

F. SHIRLEY BOYD

175 Massachusetts Ave., Boston, Mass.

R. I. V. Ball Bearings.

Baldwin Chains and Sprockets.

J. H. Sager Line.


REXO II \$3⁸⁵

The GARFORD MANUFACTURING COMPANY, 2506 Olive St., ELTRIA, O.

Successors to THE DEAN ELECTRIC COMPANY.

Meet me at the
Tuller

For Value,
Service, Home
Comforts




New HOTEL TULLER
Detroit, Michigan

Center of business on Grand Circus Park. Take Woodward car
get off at Adams Avenue.

ABSOLUTELY FIREPROOF

200 Rooms, Private Bath,	\$1.50	Single,	\$2.50	Up, Double
200 " " "	2.00	"	3.00	"
100 " " "	2.50	"	4.00	"
100 " " "	3.00 to 5.00	"	4.50	"

Total 600 Outside Rooms. All Absolutely Quiet.
Two Floors—Agents' Sample Rooms. New Unique Cafes and Cabaret Excellence



SPEDOLENE solves the problem of automobile and motor truck gear lubrication. One trial is all we ask. "A fair field and no favor" will demonstrate to your satisfaction that SPEDOLENE is the King of all lubricants for gears.

Henry H. Kroh, Boston Distributor.
MANUFACTURED BY
Continental Asbestos Corporation, Worcester, Mass.

MOTOR PARTS COMPANY
OFFICIAL
BOSCH DISTRIBUTOR

Zenith Carburetor Mohawk Tires Leak-Proof Rings

185-187 Columbus Avenue, BOSTON
818 No. Broad St., PHILADELPHIA SPRINGFIELD, MASS.

Peerless Quality in Smaller Size

"ALL PURPOSE" FOUR AND SIX
FOUR AT \$2,000 (Sixes \$250 Extra)
THE PEERLESS MOTOR CAR CO., CLEVELAND, OHIO

Makers also of the "48-Six" and Peerless Trucks.
Licensed under The Kardo Patents.

**AUTOMOBILE
ELECTRIC LIGHTING SPECIALTIES**

For the Automobile Owner and Manufacturer
who wants SERVICE for his money

ELECTRIC LIGHTING SPECIALTIES Made to Order
CULVER-STEARN'S MFG. CO.
Worcester, Mass. Detroit, Mich.

can be maintained for the entire circumference by either releasing or taking up on the adjusting nuts "F" and "G." To demonstrate this assume that the band has too much clearance at the bottom and not enough at the top. This could be adjusted by screwing down on the nut "F" until the required dimension was reached. During this operation it will be found that the relative position of the upper part of the brake band has been changed; if there is too little clearance between the band and drum the nut "G" should be released, or if it is found that there is too much clearance, the nut "G" should be screwed down. Each wheel should be adjusted in the same manner, after which the lever "E" and rod "H" should be connected. In connecting these do not pull the lever "E" away from the bracket "D," but lengthen the rod "H." This can be accomplished by letting out on the clevises at the end of the rods. If the above instructions are followed closely, it will not be necessary to try the external brakes a notch at a time, as they are equipped with equalizers and will, therefore, adjust themselves, providing, of course, that the levers and arms do not get rusty or gummy from lack of care. If the brake squeaks it is a sign that it is dirty and needs cleaning. The dirt works into the pores of the lining and results in a glazed surface. The only remedy for this is to remove the wheel and clean the linings with gasoline or kerosene, applying with a stiff brush.

CARBON ERADICATOR.

The defects in the working of the engine often are traced directly to the accumulation of carbon in the cylinders, which causes extra consumption of gasoline, worn and broken piston rings, loss of compression, pre-ignition, knocking and several other troubles.

The J. L. Yost Manufacturing Company, 431 Van Ness avenue, San Francisco, Cal., is producing a carbon remover known as the Yost Standard Carbon Remover, it is made in the shape of pellets and is sold in boxes containing 48 pellets each. The instructions state that four pellets placed in each cylinder will remove all the carbon, and if the carbon is not thoroughly crystallized the result will be instantaneous; but, even if it is crystallized it is said that the remover will gradually soften it, and then it can be easily emitted through the exhaust. With the carbon removed two pellets will keep the cylinders free from further carbon accumulations. This method of removing carbon does not leave scratches and furrows in the cylinder or on the piston, as is

(When Writing to Advertisers Please Mention The Automobile Journal.)

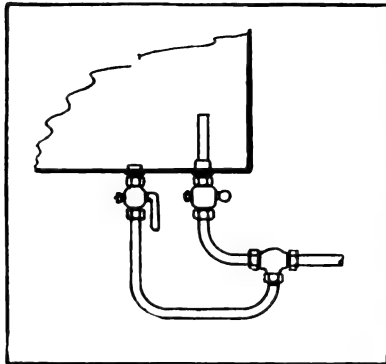
generally the case when the carbon is ejected by scraping. The Yost company guarantees this remover as a sure and safe means of keeping the engine free from carbon and as absolutely harmless to the metal. These pellets are sold \$1 per box and in one dozen box lots for \$10.

EMERY STICKS USEFUL.

Emery sticks can be used for a great many purposes on an automobile, such as to clean platinum points and the carbon brushes in the magneto. To make an emery stick, procure a piece of wood and whittle it into the shape of a file. Next glue on a piece of emery paper or cloth and use the same as any rasp. Sandpaper can be used in the same manner for work on wood.

SIMPLE EMERGENCY TANK.

Many of the late model cars are equipped with an emergency tank for an extra supply of fuel. A simple arrangement, applicable to the ordinary gas tank, will secure the same result as the separate compartment. As seen in illustration, there are two outlets from the container which join in one common supply pipe about 10 or 12



Showing Service and Emergency Pipes of Fuel Tank.

inches away, and each of these is fitted with a shut-off valve close to the tank. It will be noted that the end of the common supply pipe extends vertically for about three inches into the tank, while the other pipe, which is an emergency member, is almost flush with the bottom. The shut-off valve of the latter is kept closed. When the motor stops the driver knows that all the fuel except the last three inches has been consumed. The emergency valve can then be opened to allow the remaining gas to be used until the supply can be renewed.

TIMING THE VALVES.

Before trying to adjust the cam shaft or valves, it is necessary that a person be conversant with the fundamental principles of a four-

The Oil That Gets You There

No grade too steep, no road too sandy, when you lubricate with

Polarine

Polarine Oil keeps your motor in first-class condition. Least carbon, least friction, best compression, best mileage—with Polarine, the standard oil for all motors.

At all garages and dealers

Use Socony Motor Gasoline

STANDARD OIL CO. OF NEW YORK

New York
Buffalo



Albany
Boston



Save Your Tube—Don't Ruin It



You can save expensive tubes—you can save annoying tire changes—by applying a Goodyear White Seal Tube Patch.

They are made for your convenience and efficient service—not for just sales.

Motorists should learn how easily Goodyear Tire Savers are applied. They will save you many needless "lay-ups" when on the road.

They are designed for instant and simple application. The White Seal Tube Patch is made of pure rubber. They have a feather edge which prevents the patch from tearing away and leaking. They come in four sizes, packed in handy cartons ready for your tool chest. Learn more about these Goodyear Tire Savers.

We gladly send you book with complete instructions for applying. Address Desk 46.



The Goodyear Tire & Rubber Co., Akron, Ohio
Makers of Goodyear Automobile Tires (2362)

THE JITNEY BUS

has established a new industry, involving millions of dollars and furnishing employment to tens of thousands of men. The industry is new, crude and unorganized, but growing by leaps and bounds. The Jitney 'bus is solving some transportation problems and revolutionizing others.

MILLIONS OF DOLLARS

will be made in the Jitney 'bus business. Here is a new industry that is growing faster than the automobile business or moving picture business did at a like age. Get posted and take advantage of this new live opportunity.

THE NATIONAL JITNEY

a weekly newspaper, published every Saturday, will tell you all about the Jitney 'bus business and what it is doing all over the world. If you drive a Jitney, if you want to buy or sell an automobile, if you want to make money in this new industry of the hour, send \$2 for one year's subscription, or \$1 for six months. Anyway, write today, enclosing 10 cents coin or stamps for sample copies.

THE NATIONAL JITNEY

1215 Phelan Building San Francisco, Calif.

Tarvia

**PREVENTS DUST
PRESERVES ROADS**

Booklets on request

BARRETT MANUFACTURING CO.

New York, Chicago, Philadelphia, Boston, St. Louis, Cleveland, Cincinnati, Pittsburgh, Detroit, Birmingham, Kansas City, Minneapolis, Salt Lake City, Seattle.



American Made for American Trade

**New Departure
Ball Bearings**

**THE NEW DEPARTURE MFG. COMPANY,
BRISTOL, CONN.**

BRAENDER TIRES & TUBES



Are of the highest quality and the cheapest on mileage. They are built to last. Send for price list and particulars.

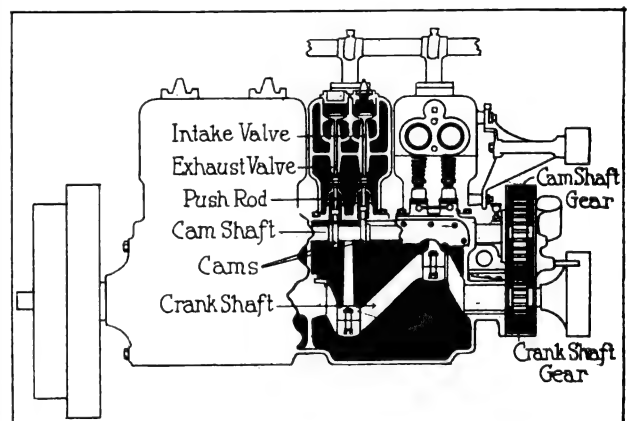
BRAENDER RUBBER & TIRE CO.

Main Offices and Factory, RUTHERFORD, N. J.

cylinder, four-cycle motor. A four-cycle engine of the poppet valve design must have an exhaust and an intake valve for each cylinder, the valve being held to its seat by a large spring. These valves are raised from their seats by lifters, which are operated by a shaft fitted with a series of cams, there being one for each valve. When the shaft is rotated these cams lift each valve in its proper order to admit fresh gas to the cylinder or to emit old gas. Each cylinder has a piston attached to a crankshaft by means of a connecting rod.

The crankshaft and the camshaft run parallel to each other and they are fitted with gears which mesh. The camshaft gear has double the number of teeth of the crankshaft gear, and, therefore, the crankshaft makes two complete revolutions while the camshaft is making one.

Gas is admitted to the cylinder by the first, or downward, stroke of the piston, the intake



Sectional View, Showing How Timing Gears Operate the Camshaft and Crankshaft.

valve being opened simultaneously by cam movement. The intake valve closes on the upward stroke of the piston, which compresses the charge. At the completion of this second stroke, while the piston is on dead centre, a spark is sent from the magneto, or other source, across the gap of the spark plug contact points, located in the combustion chamber of the cylinder, and the gas is ignited. The expansion drives the piston down for the third, or propulsion, stroke. During all three strokes of the piston the exhaust valve has remained closed, but as soon as the force of the explosion is spent, the camshaft lifts the exhaust valve and the burned gas is ejected through the open exhaust valve when the piston returns to the top of the cylinder on the fourth and last stroke. These four movements of the piston are known as cycles.

(When Writing to Advertisers Please Mention The Automobile Journal.)

Each cylinder has but one power stroke to two complete revolutions of the crankshaft, hence it will be apparent that the camshaft must only turn once while the crankshaft is turning twice; if they were geared to run at an equal rate of speed, either an intake or an exhaust valve would be open at all times and compression would be impossible. While cylinder No. 1 is in operation the remaining three cylinders have, of course, been similarly engaged. Each one does not fire at the same time; the cylinders are timed so that a different operation is taking place in each member at the same time. To fully demonstrate this, consider a motor that has the firing order of the cylinders in one, three, four, two rotation. With this firing order in mind the following diagram will illustrate what is actually happening in each cylinder at each half turn of the crankshaft:

Cylinder No. 1.	Cylinder No. 2.	Cylinder No. 3.	Cylinder No. 4.
Intake	Compression	Exhaust	Fire
Compression	Fire	Intake	Exhaust
Fire	Exhaust	Compression	Intake
Exhaust	Intake	Fire	Compression

Usually the flywheel will have two series of indicating works, five works being on each side, to indicate the proper position of the crankshaft when the valves should open or close. The crankshaft is designed to carry the pistons in pairs, as, for example, No. 1 and No. 4 may have their upward strokes at the same time, the former going up on compression and the latter on exhaust, while numbers two and three are going down on the explosion and intake strokes, respectively. With these principles in mind, the operation of camshaft setting and valve adjustment should present no difficulties to the average individual.

HANDLING HEAVY OILS.

Many chauffeurs and owner drivers grumble at the time required to pour heavy oils from containers into the parts needing this kind of lubricant. While engine oils generally flow freely if the tank or filler has a fair sized orifice, the heavier lubricant used in transmissions and differentials run very slowly. This is usually made more tedious by the housing having small openings. If the lubricant is heated for a few minutes it can be poured as easily as a lighter oil. As soon as the oil cools it will resume its original consistency.

HANDY MOTOR PRIMER.

It is often necessary to prime a motor before it can be started. Many priming devices can be

(When Writing to Advertisers Please Mention The Automobile Journal.)

DIXIE 20TH CENTURY MAGNETO

The nature of the spark from a high-tension magneto just *penetrates* the mixture. The waste of heat units in slow burning battery-timer sparks is utterly impossible with the

20th Century DIXIE
SPLITDORF
Electrical Co.
NEWARK, N. J.



(All SPLITDORF features are fully covered by patent or patents pending)



BALL BEARINGS REGROUND

at one-fifth the cost of new, also New Single Row Annular, Thrust, New Departure Double Row and Radax Bearings.

AHLBERG BEARING CO.

Boston Chicago Detroit
New York Los Angeles Cleveland

VALVOLINE OIL CO.

Heavy, Medium and Light

Automobile Oils

27 STATE STREET BOSTON, MASS.

ALDING PORCELAIN PLUGS



Regular

75c Value

50c

EACH

Write for a gallon of the famous
"ALDING" Oil, in "DUCK" Can, 75c Delivered
ALSTEN & GOULDING COMPANY
36 Foster Street, Worcester, Mass.

HARRIS

TRADE MARK REG. U.S. PAT. OFF.

OILS AND GREASES

DOES SHE SMOKE?

Well, she ought not to. No matter whether she is old or young, your car can be properly lubricated. Smoke means that your lubricant is being wasted—that carbon is depositing on piston heads and valves.

You will find, by using pure HARRIS OILS, that the smoke nuisance can be eliminated. That is one of the reasons why so many dealers recommend them.

Sold in Bbbs., Half Bbbs., 10 Gal.,
5 Gal. and 1 Gal. Cans.

"A Little Goes A Long Way And
Every Drop Counts."

A. W. HARRIS OIL CO.
326 S. Water St.
Providence, R. I.

Branch: 143 No. Wabash Ave.,
Chicago, Ill.



STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF AUG. 24, 1912.

PUBLISHED SEMI-MONTHLY AT PAWTUCKET, R. I.

NAME OF	POSTOFFICE ADDRESS
EDITOR, W. W. Scott.....	Pawtucket, R. I.
MANAGING EDITOR, W. R. Blekford.....	Pawtucket, R. I.
BUSINESS MANAGER, W. H. Black.....	Pawtucket, R. I.
PUBLISHER, W. H. & D. O. Black, Jr.....	Pawtucket, R. I.

OWNERS: (If a corporation, give its name and addresses of stockholders holding one per cent. or more of total amount of stock. If not a corporation, give names and addresses of individual owners.)

WM. H. BLACK.....	Pawtucket, R. I.
D. O. BLACK, JR.....	Pawtucket, R. I.

Known bondholders, mortgagees and other security holders, holding one per cent. or more of total amount of bonds, mortgages, or other securities: (If there are none, so state.)
NONE.

(Signed) WM. H. BLACK, Member of Firm.

Sworn to and subscribed before me this 10th day of April, 1915.

(Signed) ROSCOE M. DEXTER, Notary Public.
(Seal) (My commission expires June 30, 1917.)

DIXON'S GRAPHITE GREASE NO. 677

For Transmissions and Differentials

Covers bearings with a durable, oily veneer that keeps metal surfaces apart. Booklet No. 210-G.

Made in Jersey City, N. J., by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827 G. 38

(When Writing to Advertisers Please Mention The Automobile Journal.)

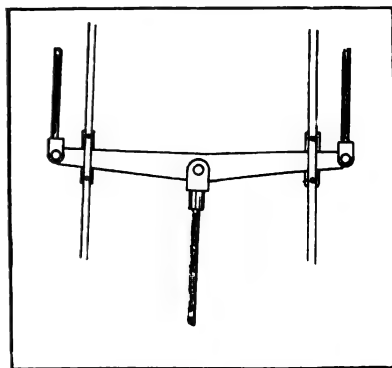
purchased, but one which is as handy as the most expensive can be made from an ordinary tire valve dust cap. A small hole should be drilled in the end of the cap so that the gasoline can be fed to the priming cap on the cylinder. By placing the finger over the hole the gasoline cannot escape and it can be carried anywhere. The feature of this primer is that the small hole in the end of the cap does not impair its use as a dust cover for the tire valve and it can be used as such when not needed as a primer. This dual utility saves the operator the trouble of looking through the tool box when he wishes to find the primer and it is equally as useful to protect the valves.

EQUALIZING BRAKE ACTION.

Automobile engineers generally are designing methods of equalizing application of braking pressure to each wheel. Although there are many different

sizes and types of equalizing devices, yet the principle does not vary from that shown in the accompanying illustration.

The power from the foot pedal, or hand lever, is applied to the



Illustrating Brake Equalizing Principles.

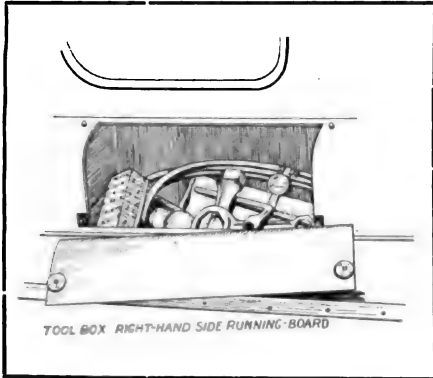
centre of the bar, to the ends of which the brake rods are fastened. The bar, or whiffletree, is capable of longitudinal movement in the guides provided for it. When the brake lever is operated, the whiffletree, and also the brake rods, the rods will be drawn forward, adjusting themselves until an equal pressure is applied to each wheel.

SQUEAKING SPRINGS.

Experience has taught some motorists that flaked graphite placed between the spring leaves silences the squeak. The graphite deposits a film over the surfaces that seems to endure indefinitely. To apply, remove the weight upon the springs by raising the car on a jack and spread the leaves. Dust the graphite between the leaves with a feather.

NEW REFINEMENTS OF PREMIER CARS.

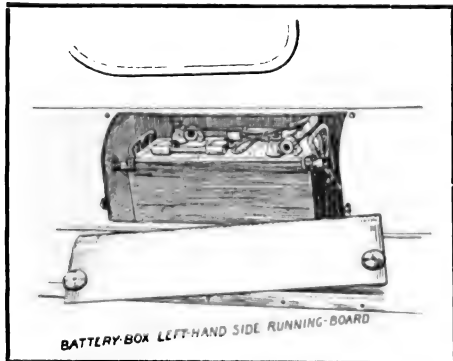
The tendency of automobile engineers in the past few years has been to clear the running boards of cars of the unsightly and obstructing



TOOL BOX RIGHT-HAND SIDE RUNNING-BOARD

gas tank, tool box, extra tires, storage battery box and other impediments. The Premier Motor Manufacturing Company, Indianapolis, Ind., has concealed both battery and tool box in its new models, but has not placed them where they cannot be easily reached, as has been the case in some attempts at refinement. The storage battery is placed in the shield of the left hand running board, and the tool box is found in a similar compartment on the opposite side of the car. The battery is made secure in its compartment by being built into the shield and in addition is reinforced and strapped to the frame by two steel bands. It can be removed easily for inspection or repair by loosening the wing nuts which fasten to rods clamping the battery in position.

The tool box compartment is a decided convenience over the old method of carrying the



BATTERY BOX LEFT-HAND SIDE RUNNING-BOARD

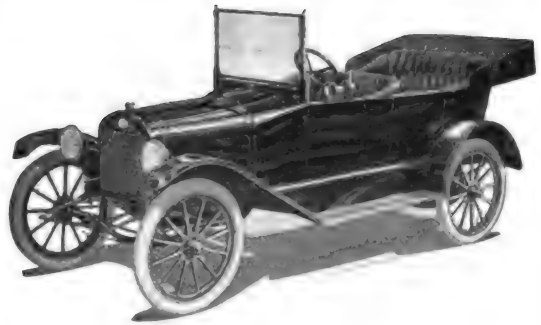
kit either under the front or rear seats. The compartment on the new Premier cars has capacity sufficient for a full set of

tools and still have room for any extra tools that operator may wish to carry. The compartments are shown in the accompanying illustrations.

KEEP LENS MIRRORS CLEAN.

The importance of keeping the lens mirrors and front glasses clean is not generally recog-

(When Writing to Advertisers Please Mention The Automobile Journal.)



METZ "25"

The Quality Car

\$600 Equipped Complete, Including Gray & Davis Electric Starter and Electric Lights, Instant One-Man Top, and Built-in Rain Vision Wind Shield.

LOOK through the entire list of cars on the market, and you cannot find one that is more pleasing and satisfactory to the majority of prospective buyers than the new Metz "25" Touring Car model. Why not sell the car that is bound to make you the most friends? A satisfied customer means another sale. Write for Dealer's particulars and new catalog "Q."

METZ COMPANY, WALTHAM, MASS.

EISEMANN

The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.

The Eisemann Magneto Company

Sales and General Offices,
32-33d St., Brooklyn, N. Y.

New York, N. Y. Indianapolis, Ind. Detroit, Mich.
123 W. 52nd St. 415 N. Capitol Av. 802 Wd'w'Av.



NEW DOVER GARAGE SOAP ECONOMIZER

**Reduces Soap Consumption Over One-Half
Saves all Waste
Prevents Theft**

SEND FOR 1914 CATALOGUE



(2) **Dover Stamping & Mfg. Co., Cambridge, Mass.**

HOTEL MAJESTIC

Central Park West at 72nd St.,
New York

Copeland Townsend, formerly Manager of the Hotel Imperial, New York, is now proprietor of the Majestic.

Overlooking Central Park and away from the noise and heat of lower Broadway, the Majestic offers to motorists a haven of quiet and rest after a tedious journey. During the summer season small suites consisting of sitting room, bedroom and bath may be secured at very low prices.

The Cafe Moderne and the roof garden offer dancing nightly.

NOTICE FOR OWNERS AND CHAUFFEURS:

Coming into New York via Broadway, or down Fifth Ave., you will find this hotel conveniently located at the 72nd St. entrance to Central Park. A splendid garage just around the corner.

COPELAND TOWNSEND
Managing Director

Why Pay Excessive Hotel Rates?

THE NEW AMSTERDAM

Euclid Avenue at 22nd Street, CLEVELAND, OHIO

A five minutes walk from the active centres, yet overlooking the most beautiful residence section of Cleveland.

"The logical resting place for tired Tourists."

Large airy suites of from two to five rooms (also single rooms.)

GARAGE NEARBY

RATES:—\$1.50 per day, each person

Dining Room Modified *a la Carte*

A. A. McCASLIN, Managing Director

L. McNAMARA, Manager

Scripps-Booth

LUXURIOUS LIGHT CARS Deliveries NOW

Never before have such luxury and beauty been offered in a light car.

Demonstration proves that there is no greater riding comfort or more satisfactory performance in any car at any price.

Now in the sales rooms.

Scripps-Booth Company
Detroit, Michigan



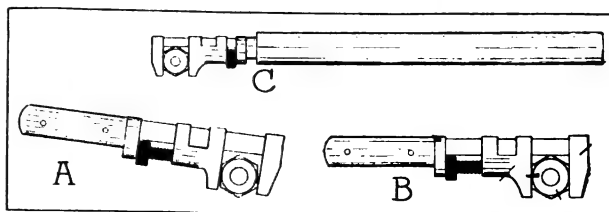
(When Writing to Advertisers Please Mention The Automobile Journal.)

nized. A greasy or dingy surface, such as follows one or two days' service, absorbs a considerable proportion of the light rays. The best method of cleaning the lens is to use a mixture of equal parts water and denatured alcohol. This solution will cut the grease or soot. It should be applied with a clean, soft cloth, so as not to scratch the surfaces.

PROPER USE OF A MONKEY WRENCH.

Among the tools most frequently misused by the mechanic and the motorist is the monkey wrench. This tool is often used as a hammer, and while no special damage may result in light work, yet if it is used for driving out tight set parts, the jaws will soon become sprung and the sliding member hammered out of shape.

There is a right and wrong way in which a wrench may be used. If the tool is applied in a reverse position, as shown in Fig. A, the jaws are very liable to spread, as the stationary jaw is seldom able to stand a leverage applied to its



Proper and Improper Use of Monkey Wrench.

extreme end equal to that applied to the movable member. The reason for this is that the stationary jaw is supported at only one end, while the movable part is supported by the shank and is also re-enforced by the adjustment screw at the other end. When the wrench is used as shown in Fig. B, the stress of turning comes against the sliding member. The more closely the jaws fit the nut the less will be the spreading force, and consequently the stationary jaw is less likely to be bent. It is also advisable to use a wrench of proper size, according to the character of work being done, and not try to increase the leverage of a small wrench by fitting a pipe or tubing over the handle, as shown in Fig. C. It is always well to keep a variety of wrenches at hand so that the proper size can be used.

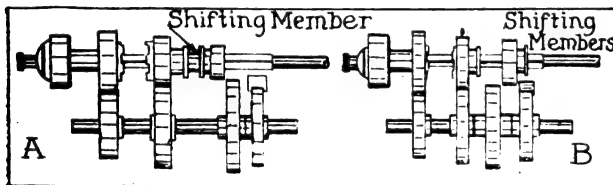
REMOVING A BROKEN STUD.

One of the most difficult of repair jobs is to remove a stud that has broken off flush. Practical mechanics sometimes cut a slot across the

end of the stud, resembling the slot of a screw, and endeavor to unscrew the broken portion. If it does not yield under that treatment it may be loosened sufficiently by carefully tapping on its edges by a small square-ended punch and a hammer. It is always advisable to treat a stubborn stud with heat and then lubricate thoroughly with kerosene. The final resort is to drill it out, but because of the delicacy of the operation it is not generally advisable for the novice to attempt this method. If the drill should slip from its straight line, the thread of the hole may be irreparably injured. The capable mechanic will drill for the greater length of the stud, until only a shell is left, which he removes carefully with a chisel. Another method sometimes adopted is to drill a small hole in the top of the stud and insert a square punch, which can be turned somewhat like a screw driver.

TWO TYPES OF GEARSETS.

The chief distinction between progressive and selective types of gearsets in sliding gear trans-



Progressive and Selective Types of Transmission Gearsets.

missions is in the method of operating the speed changes. In the progressive type, which is shown in Fig. A, but one shifting member is used for all speeds, and a continuous or progressive movement of the shifting lever produces in succession all the gear ratios from reverse to the highest. In changing from the low speed to the high it is compulsory to pass through the intermediate and into the high. From the high to the reverse the shifting member passes through the intermediate and the low into the desired position.

In the selective type the operation differs somewhat. Two shifting members are employed and the operator may engage any speed direct, without having to pass through any other. This type is illustrated in Fig. B. Both types are being installed by leading makers, and each has its advantages.

UNEQUAL TIRE WEAR.

Frequently one rear tire of a car will become more worn than the others and when such a con-

(When Writing to Advertisers Please Mention The Automobile Journal.)

WHY DIDN'T I TIE UP TO

Miller Tires!

This is the question that many dealers will ask before the season is a day longer. Dealers turn to Miller because the Miller plan of selling tires doesn't pit one dealer against another. It gives him all the profit from all the tires sold in his territory.

Dealers turn to

**Miller
Tires**

The GEARED
TO THE ROAD
Tread

because selling Miller Tires means making money and making it easy because motorists are quick to learn that the Miller Method of building tires

**Retains all the natural oil
and wax in the fabric and
the rubber's native tough-
ness for wear on their car.**

Don't keep asking yourself "Why didn't I tie up to Miller Tires?" Tie up now while the season is young and be *the* "One dealer in your town." Wire or write for details of the Miller Plan.

THE MILLER RUBBER CO.,

AKRON, Ohio, U. S. A.

TRADE MARK
NON-FLUID OIL
REGISTERED IN
UNITED STATES PATENT OFFICE

**Is BETTER Than LIQUID Oils
or GREASES**

because it obviates their inherent faults. Unlike LIQUID oil it does not waste off, but STAYS WHERE PUT and lubricates PERFECTLY to the last small particle. Unlike grease, it contains nothing to decompose and develop acidity—it contains no resinous or other substances of non-lubricating properties that gum the bearing, retard the drive of the gears, and that radically increase friction and wear. NON-FLUID OIL is not only the BEST motor car lubricant but the MOST ECONOMICAL, as a comparison will prove. 90% of all automobile manufacturers recommend it. Why don't YOU try it?



"K. No. 00 Special" grade for sliding gear transmission.

"K. No. 000" for differential, compression cups and all bearings. Sold by leading dealers everywhere. Avoid substitutes. Look for the orange-colored can bearing sprocket-wheel trade-mark shown above.

**New York & New Jersey
Lubricant Co.**

165 Broadway, New York
1430 Michigan Avenue, Chicago, Ill.

Write today for
our Territorial Agree-
ment on the New

\$1,000

**Inter-State
"FOUR"**

The ONE popular priced car with
the greatest selling arguments
in the country

INTER-STATE MOTOR CO.
804 W. Willard St.,
MUNCIE, IND.

Mea
MAGNETOS



**S. R. O.
BALL BEARINGS**



Sole Importers

MARBURG BROS., 1790 Broadway, NEW YORK

(When Writing to Advertisers Please Mention The Automobile Journal.)

dition is noted the owner should investigate the adjustment of the brakes. If one brake band grips its drum tighter than the other, naturally the tightest clamping band will lock its wheel first, causing the tire to drag on the road surface until the car is stopped. Frequently one band will not hold, in which event the opposite tire must receive all the stress.

Many car builders have sought to overcome this defect by equipping their car brakes with equalizing bars, which are designed to distribute the braking power evenly to both wheels. While in many cases these equalizers serve very useful purposes, yet with them there is danger of excessive wear on one of the tires. Driving on the right side of the road there is always a possibility of the rear axle grease working through the housing and on to the brake drum. This result is caused by the crown of the road, which keeps the car on a slight angle. When grease is on the brake drum the wheels will not lock, no matter how well the equalizing bar may be designed. With an equalizing bar one of the brakes may be linked too tightly, thus causing that member to grip and slide along the street while the other wheel runs free.

CONVERTING WOOD INTO METAL.

How to convert wood into a resemblance of metal is the subject of an article in Railroad and Locomotive Engineering. The wood is placed in a bath of caustic alkali, at a temperature of about 190 degrees, where it is allowed to remain for two or three hours, the time depending upon the porosity of the wood. It is next placed in a bath of hydrosulphate of calcium and after about 24 hours a concentrated solution of sulphur is added. After remaining in this mixture 28 hours longer the wood is removed to a bath of acetate of lead, which is kept at a temperature of 100 degrees. Here it rests for 50 hours more, at a temperature of 170 degrees, after which the process is complete. When the wood has become perfectly dry it is susceptible of a high polish and remains unaffected by moisture, etc. This wood is not, however, as strong as the metal which it represents.

TAR ON CAR AND CLOTHING.

Tar can be removed from clothing and from the automobile as well, by the use of benzine, which should be applied with a soft cloth, providing the tar has not become too hard and firmly fixed.

WHY TRANSMISSION GEARS CLASH.

The grinding or clashing noise sometimes heard when the transmission gears are changed is generally caused by a clutch that is of faulty construction or has become badly worn. Either of these conditions permits the clutch to spin after it has been disengaged. To the uninitiated it might be pointed out that when the clutch does not become fully disengaged, it will continue to revolve the constant mesh gears in the transmission, thus making it difficult to change gears. All clutches spin when released, but if properly designed, or in good condition otherwise, its revolutions gradually cease, so that a gear change can be made easily. The majority of cone clutches that cause trouble will be found to have worn bearings or bushings, which allow the male member to sag and contact with the flywheel when the clutch is fully disengaged. To locate the trouble remove the front floor board while the motor is in operation, disengage the clutch and note if it continues to spin.

NEW GASOLINE HAZARD.

An eminent chemist recently declared to insurance agents that a frequent cause of automobile fires is that sometimes when gasoline is poured into the tank from a can, frictional electricity is generated and a blaze results. The electricity is generated by the gasoline flowing over the can nozzle, and charging the funnel. When both have become charged to a certain point an electric impulse will leap to a grounded object. The chemist declares that the danger is less prevalent during humid or rainy days, and is above normally possible when the atmosphere is clear, cool and crisp. The moral of this is, never hold the gasoline can, or other container, in close contact with the funnel.

AN EXCELLENT METAL POLISH.

A very good polish for brass, nickel or silver can be made by mixing two parts of alcohol, one part of ammonia and enough whiting to form a cream-like consistency. The alcohol and ammonia will dissolve the dirt and oxide, which will be absorbed by the whiting. Ordinary starch powder can be substituted for whiting, if necessary. The liquid should be allowed to dry and then rubbed off with a soft cloth. The metal will then be extremely bright.

(When Writing to Advertisers Please Mention The Automobile Journal.)

HEINZE

MAGNETOS

are superior both mechanically and electrically. Equip with HEINZE and your Ignition requirements will be satisfied.

HEINZE ELECTRIC CO.

Factories—Lowell, Mass.
Sales Offices—Detroit, Mich.

Branch
Offices:
New York,
Detroit,
Chicago,
Minneapolis.

New Eng-
land Agent:

Arthur
Patch
Homer,
Boston,
Mass.



20,000 GUARANTEED

When you have anything to say to those in the automobile industry use straight trade talk copy in the

Accessory and Garage Journal

The only strictly automobile trade paper published in America

Automobile Journal Publishing Co.

Publishers

AUTOMOBILE JOURNAL **MOTOR TRUCK**
Times Building, Pawtucket, R. I.

Thermoid HYDRAULIC COMPRESSED Brake Lining-100%

THERMOID RUBBER CO., TRENTON, N. J.

The Fastest Riding
Car in the
World
MARMON
F. E. WING
562 Commonwealth Ave.
BOSTON, MASS.

New England Dealer for

NORDYKE & MARMON CO., Indianapolis, Ind.

MARMON "41"
\$3250

132" Wheelbase

MARMON "48"
\$5000

145" Wheelbase

THE MOTOR TRUCK

**A Recognized Authority in the
Commercial Vehicle Field**

12 ISSUES

\$2.00 THE YEAR

The A. J. Automobile Library

(Including All of the Famous A. B. C. Books)

A Complete Library of
Automobile Mechanics **\$4.75**

Transportation Charges Prepaid

Distinct Books—1000 Pages of Text—All Copies Indexed—2000 Illustrations,
Including Practical Working Page Charts and Trouble Finders.

Books written by recognized authorities. Especially prepared for those
who have to do with the sale, care, repair and operation of motor vehicles,
their parts, equipment, accessories, etc.

The practical information in these works cannot be secured through any other
series or number of books or for 50 times what is charged for this library.



Engine . . .	35c	Chassis . . .	25c
Magneto . . .	35c	Lighting . . .	50c
Carburetor . . .	35c	Operation . . .	50c
Battery . . .	35c	Overhauling . . .	50c
Tires . . .	25c	Motorcycle . . .	35c
Truck Operation \$1.00			

Automobile Journal Publishing Company

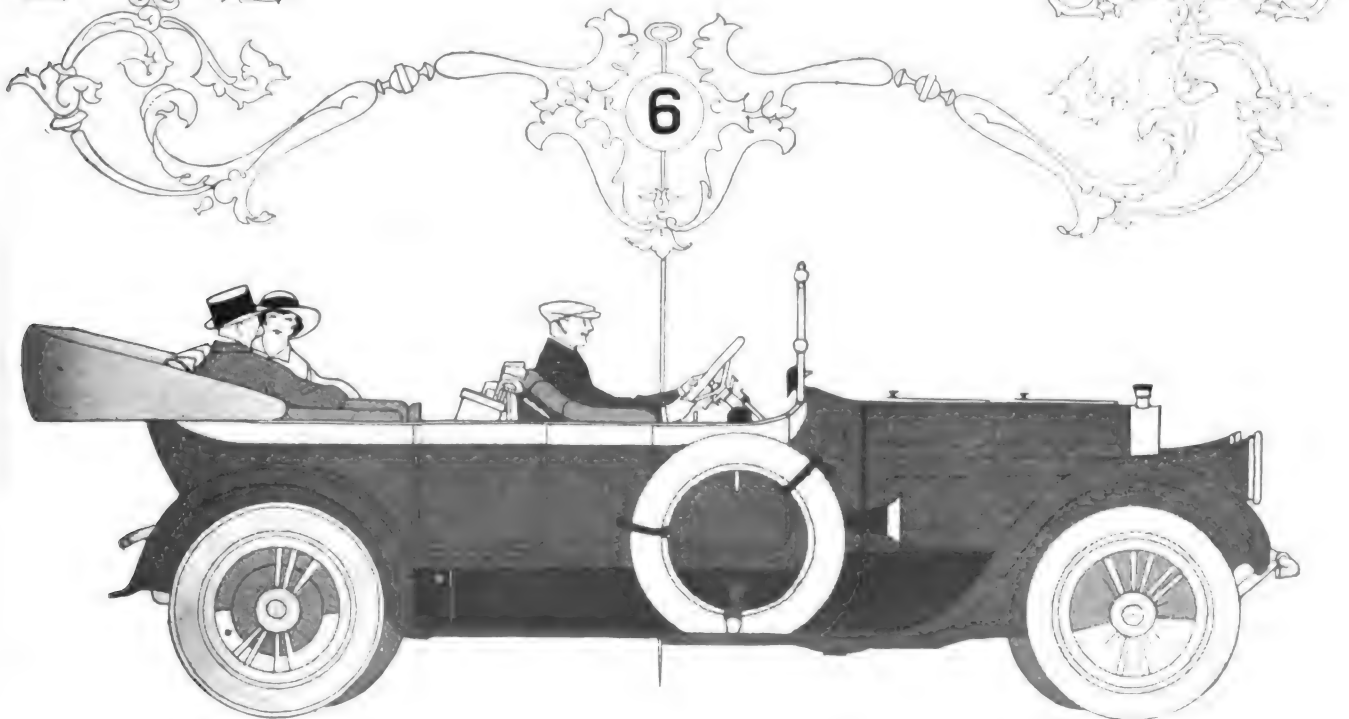
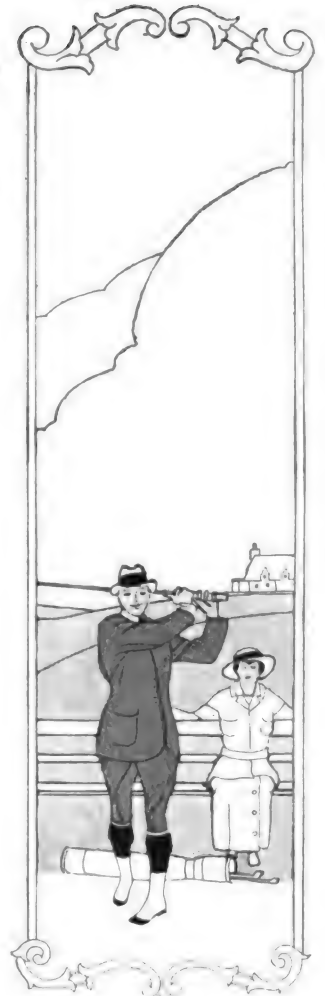
Times Building

Pawtucket, R. I.

PIERCE- ARROW

Upon service you build your daily plans, of an inconceivable complexity, all of which would be thrown into confusion if the Pierce-Arrow missed at any point, but which are carried out to a perfection of nicety every day—not once on some fortunate, red-letter day, not on alternate Wednesdays or odd Fridays, but every day in every year.

THE PIERCE-ARROW MOTOR CAR CO.
BUFFALO NEW YORK



MULTIBESTOS

REG.U.S.PAT.OFF.

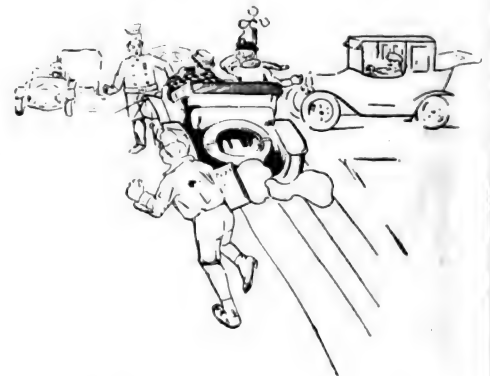
PAT. APP'D FOR

Bill Bumper and His Batabout

Bill Bumper bought a Batabout
Of ninety horse or so
'Twas a rakish, racing roadster
And its middle name was "Go."
He started out one Sunday
With the throttle open wide
To do a little grandstand play
With Jennie by his side.

They were speeding on so smoothly
When they met a traffic cop
Who held his left hand in the air
And ordered them to stop.
Then there followed such a mixup
Such excitement and such howls
That Bill he lost complete control
And hit him in the bowels.

The jury found Bill guilty
On a criminal offense.
The judge dealt out a sentence
Which showed a lot of sense.
"Bill Bumper, 'tis the court's decree
On future motor trips,
That you drive with MULTIBESTOS
And the lasting Grip that Grips."



Standard Woven Fabric Co.

Factory, FRAMINGHAM, MASS.

New York Branch and Export Office, 1779 Broadway

Boston—F. Shirley Boyd, 175 Massachusetts Ave.

Philadelphia—N. A. Petry Co., Inc., 1309 Race St.

Chicago—F. E. Sparks, 1430 Michigan Blvd.

San Francisco—Fred Ward & Son, Inc.,

Cor. First and Howard Streets

MULTIBESTOS

REG.U.S.PAT.OFF.

PAT. APP'D FOR

VOL. XXXIX.

NO. 9.

AUTOMOBILE JOURNAL

\$1.50 the year
10 cents the copy

PAWTUCKET R.I.

June 10, 1915

W O N

*How scientific experience is sweeping
aside lubricating guess-work*

TODAY the skillful automobilist knows that low fuel and maintenance bills measure his ability as an operator.

He takes pride in the "wear" he secures from his oil—in the silent and steady power which it yields—in his freedom from repair and carbon troubles.

There will always be some motorists who maintain their cars in a hazardous way. Probably they will always furnish a market for low grade, inefficient oils.

But among motorists who recognize the dan-

gers of inefficient lubrication our Chart of Automobile Recommendations has now become a standard guide.

In this Chart the careful motorist finds specified for his car, the grade of Gargoyle Mobiloils whose *quality* is beyond question and whose *body* is scientifically correct for his motor. A complete Chart will be sent you on request.

The pleasures experienced in the use of this oil are: (1) Freedom from repair troubles; (2) Silence of operation; (3) Abundance of power.

The economies are: (1) Low gasoline consumption; (2) Low oil consumption; (3) Low repair bills; (4) Longest life to your motor; (5) Greatest second hand value.

In buying Gargoyle Mobiloils from your dealer, it is safest to purchase in original packages. Look for the red Gargoyle on the container.



Mobiloils

A grade for each type of motor

The four grades of Gargoyle Mobiloils, for gasoline motor lubrication, purified to remove free carbon, are:

Gargoyle Mobiloil "A"
Gargoyle Mobiloil "B"

Gargoyle Mobiloil "E"
Gargoyle Mobiloil "Arctic"

For information, kindly address any inquiry to our nearest office.

VACUUM OIL COMPANY, Rochester, N. Y., U. S. A.

Specialists in the manufacture of high-grade lubricants for every class of machinery. Obtainable everywhere in the world.

Domestic Branches: Detroit, Ford Bldg. New York, 61 Broadway Philadelphia, 4th & Chestnut Sts. Minneapolis, Plymouth Bldg. Boston, 49 Federal St. Chicago, Fischer Bldg. Indianapolis, Ind. Pythian Bldg. Pittsburgh, Fulton, Bldg.

The 1916
Overland
TRADE MARK REG.



\$750

MODEL 83 FOB TOLEDO

\$325 Less Than Last Year

This 1916 Overland is essentially the same as our 1915 Overland—the famous Model 80 that sold for \$1075. It is the largest four cylinder Overland that will be produced this season.

Specifications

35 Horsepower motor
High-tension magneto
ignition
5 Bearing crankshaft
Thermo-syphon cooling

Underslung rear springs
33" x 4" tires;
non-skid in rear
Demountable rims;
with one extra

Electric starting and
lighting system
Headlight dimmers

Rain-vision, ventilating
type, built-in windshield

Instrument board on cowl dash
Left-hand drive, center
control

One man top and top cover
Magnetic speedometer

Overland dealers are showing samples note.

New catalog is ready. Please address Dept. 52.

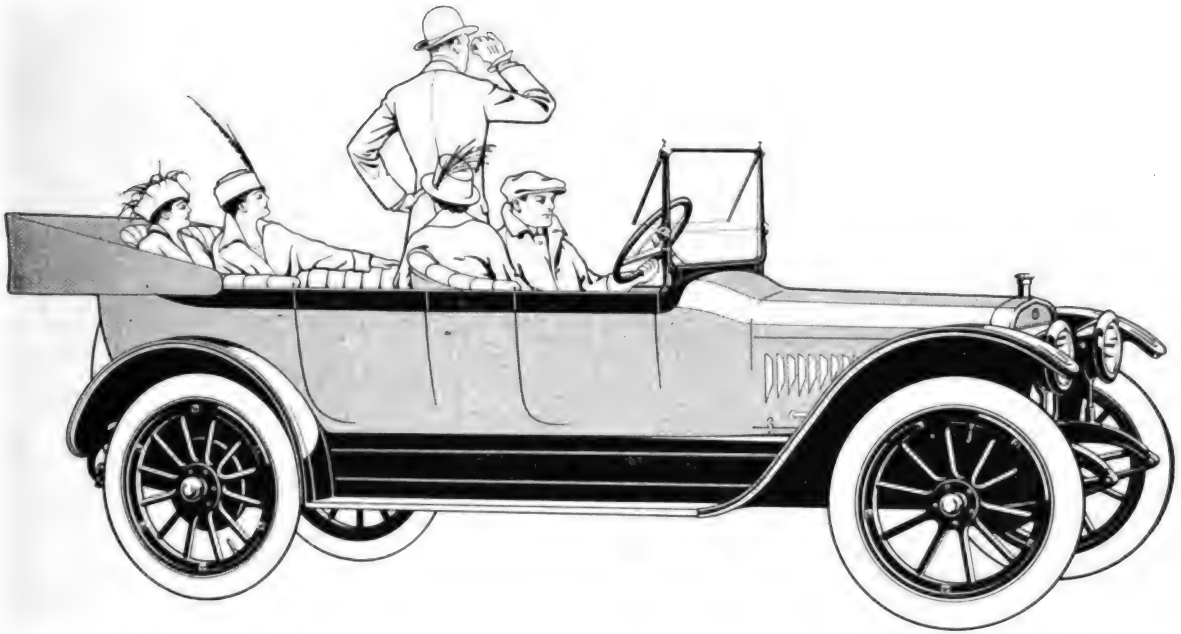
The Willys-Overland Company, Toledo, Ohio.

New Models Now on Display at the Panama Pacific Exposition.

"Made in U. S. A."



WINTON SIX



The Wonder Car of 1915

New thrills of delight, a new zest of ownership and a fresh consciousness of superiority are yours in the wonder car of 1915—the New-Size Winton Six at \$2285. Impressively high-grade in every detail of mechanism, coach work, and finish, charming alike in its appearance and its conduct, this is the one car of the year that automobile experts praise for winning excellence and freedom from experimental risks. We finish your car in your own personal colors, without extra charge.

Catalog now ready.

The Winton Company

131 Berea Road,

Cleveland, Ohio

(When Writing to Advertisers Please Mention The Automobile Journal.)

COE'S WRENCHES



UNEQUALLED FOR QUALITY THE WORLD OVER

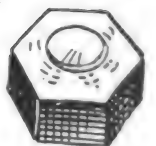
The wrench is the most used and the most useful tool in a motorist's kit.

COE'S Special Automobile Model is a perfect tool. The jaws are hardened special quality tool steel to withstand hard usage, and the handle is long to afford great leverage. The wrench is thin to work in space inaccessible for ordinary wrenches.

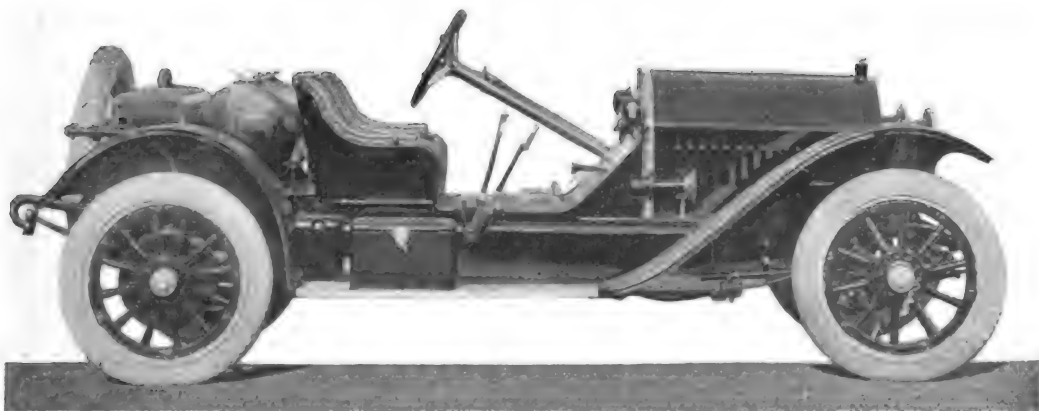
Coe's Special Automobile Model wrench is a tool kit in itself. Coe's quality costs slightly more, and it is worth many times the price of any other tool. A Coe's is always dependable, in the garage or on the road. Literature sent at request.

COE'S WRENCH COMPANY WORCESTER, MASS.

Distributors: { J. C. McCarty & Co., 21 Murray Street,
John H. Graham & Co., 113 Chambers Street, } New York City



(When Writing to Advertisers Please Mention The Automobile Journal.)



STUTZ

BY EVERY TEST THE STUTZ

Has Proven to Be the Honor Car

SERVICE under all conditions, and supremacy won in the hardest fought American road and track races, has fully established STUTZ design, speed and endurance.

Stutz construction, material, workmanship, finish, equipment, conveniences and efficiency, represent the highest value found in motor cars.

STUTZ economy, ease and flexibility of operation, as well as the comfort and luxury found only in STUTZ cars, have won the full approval of all discriminating buyers of car value.

HONOR

There Is a STUTZ for Every Use

FOUR-CYLINDER.

H. C. S. Roadster	\$1475
Bearcat	2000
Roadster	2000
Bulldog	2250
Touring	2275
Sedan	3675

SIX-CYLINDER.

Bearcat	\$2125
Roadster	2125
Touring	2400
Sedan	3800

There are STUTZ Agencies
in all principal cities

Stutz Motor Car Company
INDIANAPOLIS, INDIANA

(When Writing to Advertisers Please Mention The Automobile Journal.)

A ROUTE GUIDE, LOG, MAP and TOURING BOOK

*The Greatest Touring Book of the Greatest Tour-
ing Year—An All-America Number*

A Nation's Touring Information Crystallized
in One Edition of an Owner's Magazine

A Yearly Buyers' Guide and Reference Directory

NINTH ANNUAL TOURING NUMBER

OF THE

AUTOMOBILE JOURNAL

1915 EDITION—30,000 COPIES

To Issue July 10

Price 10 cents.

Purchased by Motorists the Country
Over and Used Everywhere

Absolutely unique with motoring publications, this edition will afford to advertisers an unparalleled opportunity to reach motor car owners who will plan their tours and buy their equipment for the season's use.

**GIVING TO ADVERTISERS IMME-
DIATE AND LASTING RETURNS**

For further facts and rates, write

Automobile Journal Publishing Company
TIMES BUILDING PAWTUCKET, R. I.



AGAIN

1915

BOSCH MAGNETOS WIN 500 MILE SWEEPSTAKES

Every Driver in the Record Breaking 500 Mile Race Used a Bosch Magneto

THERE was no difference of opinion among these close students of the motor car. They adopted Bosch Ignition without a question, not only because Bosch is more speedy, not only because Bosch is more capable, but mainly because Bosch Magneto Ignition is

ABSOLUTELY RELIABLE

A broad statement but proved by facts; for not a single driver experienced a moment's trouble with his magneto during the terrific pace set by DePalma's Mercedes, the Bosch-Equipt Victor and New Record Holder.

If You Want a Reliable Ignition
Be Satisfied Specify Bosch

Correspondence Invited

BOSCH MAGNETO CO.

204 West 46th Street, New York

Chicago—Detroit San Francisco—Toronto

Over 250 Service Stations

(When Writing to Advertisers Please Mention The Automobile Journal.)

The NEW ROYAL MASTER-MODEL 10

THE MASTER MACHINE
that need not be traded out
FEATURE No. 7

THIS typewriter masterpiece, the New Royal "10," was created to meet the modern demand of "**BIG BUSINESS**" for the typewriter that *need not be traded out*. So fast is the strenuous pace of modern business that there is no longer time or

logical reason to "trade out" periodically machines made of iron and steel. And the expense of it in the aggregate is enormous!

Built for "Big Business" and its Great Army of Expert Operators

"Big Business" demanded a typewriter of *long-term service*, that must improve the *presswork* and stand the modern "grind" at high speed for years without trading out. For years, men who have done big things—heads of great corporations and far-seeing executives have been asking: "Why is it *necessary* to trade out typewriters every little while? Is it because they have been *built* to be traded out?"

The **ANSWER** to this big question is the new Royal Master-Model 10, which is built for *long-term service*, not to be "traded out."

We believe the No. 10 Royal will outlast any other writing-machine in the world. *It will stand the grind.* Turn the machine sideways and you can see daylight right through it. Mark the absence of complicated mechanism. No cumbrous, clogging network of thin sheet-metal parts and shaky cranks. Machine "breakdowns" that tie up your letters are virtually impossible with Royal construction.

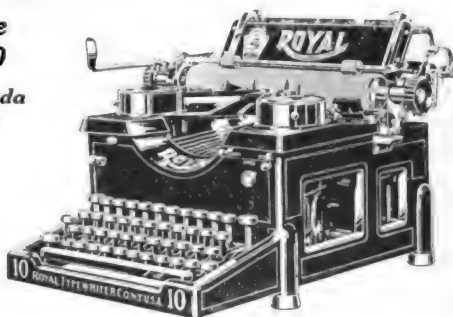
Get the Facts!

Send for the "Royal Man" and ask for a **DEMOVSTRATION**. Or write for our new Brochure, "*Better Service*," and a beautiful Color Photo of the new **ROYAL MODEL 10—"THE MACHINE WITH THE PERSONAL TOUCH."**

"Write now—right now!"

Price
\$100

In Canada
\$125



ROYAL TYPEWRITER COMPANY, Inc.
Room 12, Royal Typewriter Building, Broadway, New York.
Branches and Agencies the World Over

(When Writing to Advertisers Please Mention The Automobile Journal.)

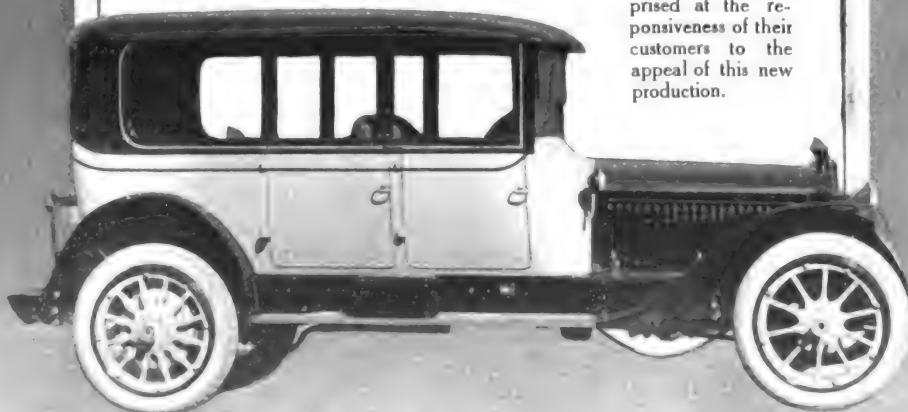
SPRINGFIELD CONVERTIBLE BODIES



THE limousine and the touring car are completely satisfactory only in certain seasons. The new Springfield Demi-Convertible body has no such limitations; it is the all-year, all purpose body.

More and more in America, as in Europe, the tendency is to demand protection from the sun, the dust and sudden showers even in touring. This body with its permanent top provides such protection, while it gives plenty of air and an unobstructed view. It may be converted into a limousine.

Dealers will be surprised at the responsiveness of their customers to the appeal of this new production.



SPRINGFIELD METAL BODY CO.
SPRINGFIELD, MASS.

COLE 4

STANDARDIZED

Cole Dealers are Making Money

THE COLE FOUR IS STRICTLY STANDARDIZED, all important units being the products of America's greatest motor car specialists, the acknowledged **bests**.

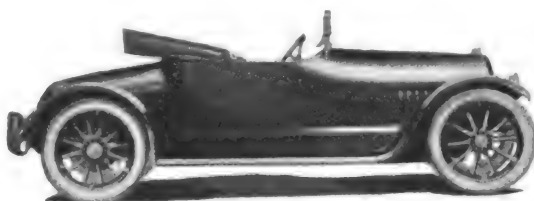
IT IS THE MOST ATTRACTIVE FOUR ever produced by this permanently established Company, which has been building successful Fours for five years.

FULL SEVEN - PASSENGER COMFORT—The wheelbase is 120 inches. Aisle-way front seats and out-of-the-way reserve seats make a "chummy," friendly seven-passenger equipage. The upholstering is genuine leather and genuine hair—it is deep and soft. The appointments of the car are superb.

A WONDERFUL HILL CLIMBER—A $4\frac{1}{4} \times 5\frac{1}{4}$ motor coupled with a road-ready weight of 3,200 pounds makes it a glutton for the hills. Direct drive spring suspension and balanced building make it stick to the road.

EXTREMELY QUIET—A perfectly counter-balanced four-cylinder motor producing a quietness once thought impossible. Noiseless helical bevel gears. This same perfect balance makes the car free from vibration.

ECONOMY—This car holds the American official fuel economy record made at the Indianapolis Speedway, October 9, 1914, under the auspices of the A. A. A.



Cole "Four" Roadster, complete

\$1485

f. o. b. the factory

A complete line of models

COLE MOTOR

INDIANAPOLIS

COLE 8

STANDARDIZED

Because Cole Cars are Selling Fast

THE COLE EIGHT IS ALSO STRICTLY STANDARDIZED—all its units being the products of America's same great specialists—the acknowledged bests of their kind.

THE COLE EIGHT DEVELOPS SEVENTY HORSE POWER with a road-ready weight of only 3,400 pounds.

WILL OUT-DEMONSTRATE all your competition, climbing hills better, getting away quicker and showing more flexibility and road possibilities.

THE LARGEST EIGHT-CYLINDER MOTOR used in any American car (Bore $3\frac{1}{2}$, stroke $4\frac{1}{2}$).

ABSOLUTE ACCESSIBILITY to all working parts.

FULL SEVEN-PASSENGER COMFORT—Wheelbase 126 inches. Direct drive spring suspension. Noiseless helical bevel gears. Aisle-way front seats. Out-of-the-way auxiliary seats. Smooth power-flow. Positive noiseless brakes. Luxurious deep upholstery. Superb appointments with recognized refinements.

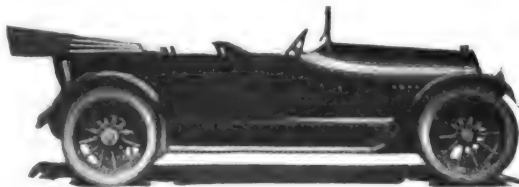
EXTREME ECONOMY made possible by a low first cost, low up-keep, due to the quality of materials and wide strength-margins. The even flow of power, lightness and balance make it easy on tires and chassis.

Cole "Eight" Touring, complete

\$1785

f. o. b. the factory

A complete line of models



CAR COMPANY

INDIANA U.S.A.

Index to Advertisers.

Page	Page
Ahlberg Bearing Co.....73	Weed-Chan Tire Grip Co.....68
Alsten & Goulding Co.....73	Willys-Overland Co.....Cover
Barrett Manufacturing Co.....67	Winton Company, The.....1
Bosch Magneto Co.....5	Zenith Carburetor Co.....Cover
Boyd, F. Shirley.....68	
Coes Wrench Co.....2	
Cole Motor Car Co.....8-9	
Continental Asbestos Corp.....70	
Culver Stearns Mfg. Co.....70	
Detroit & Cleveland Nav. Co.....72	
Dixon Crucible Co., Jos.....72	
Dover Stamping & Mfg. Co.....75	
Eagle Oil & Supply Co.....10	
Elsemann Magneto Co.....75	
Garford Mfg. Co.....72	
Goodyear Tire & Rubber Co.....68	
Harris Oil Co., A. W.....74	
Hartford Suspension Co.....68	
Heinze Electric Co.....79	
Horton, F. C.....10	
Hotel Longacre.....68	
Hotel Majestic.....71	
Hotel New Amsterdam.....71	
Hotel Tuller.....70	
Indian Refining Co.....74	
Inter-State Motor Co.....76	
Johnson, S. C. & Son.....Cover	
Longacre Hotel.....68	
Majestic Hotel.....71	
Marburg Bros.....76	
McQuay-Norris Mfg. Co.....77	
Mea Magneto Co.....76	
Mecca Mfg. & Spec. Co.....10	
Metz Company.....75	
Miller Rubber Co.....15	
Milwaukee Auto Spec. Co.....6	
Mossberg Co., Frank.....61	
Motor Parts Co.....70	
National Motor Veh. Co.....16	
New Amsterdam Hotel.....71	
New Departure Mfg. Co.....72	
Nordyke & Marmon.....79	
N. Y. & N. J. Lubricant Co.....76	
Peerless Motor Car Co.....70	
Reflex Ignition Co.....68	
Royal Equipment Co.....72	
Royal Typewriter Co.....6	
Scripps-Booth Co., The.....69	
Seiss Mfg. Co.....71	
Splittdorf Electrical Co.....73	
Springfield Metal Body Co.....7	
Standard Oil Co.....11	
Staybestos Mfg. Co., The.....74	
Superior Mfg. Co.....68	
Stutz Motor Car Co.....3	
Texas Co., The.....74	
Thermoid Rubber Co.....79	
Times Square Automobile Co.....10	
Tuller Hotel.....70	
Vacuum Oil Co.....Cover	
Valvoline Oil Co.....73	
Vanderpool Company, The.....10	

FOR SALE.
Shop Vulcanizer, Bargain.
Vanderpool, Springfield, O.

POSITION WANTED

As order clerk and salesman in progressive garage, handling accessories. Will take complete charge of bookkeeping and stock. Am steady, ambitious and energetic. Details upon request. F. C. Horton, 388 Henry St., Brooklyn, N. Y.

TIMES SQUARE AUTO CO. WORLD'S LARGEST DEALERS

In Automobiles, Accessories and Supplies. Selling Prices Lowest in the World. Send for our Latest Price Wrecker and Save Money.

TIMES SQUARE AUTO CO.

S. W. Cor. 56th St., B'way | 1210 Michigan Ave
 NEW YORK CHICAGO

DEALERS, GARAGE MEN and AUTOMOBILE AGENTS—
 To make money nowadays you *must* buy cheap. We sell supplies cheaper than any concern in the world. Send for our latest bargain bulletin.

MECCA MFG. & SPECIALTY CO.

1743 Broadway | 1208 Michigan Ave.
 NEW YORK CHICAGO

Accessory and Garage Journal

A Distinct Trade Publication

Guaranteed to Have an Exclusive
 Trade Reader Distribution of

20,000 Copies
 Each Monthly Issue

**Without a Competitor
 in Its Field**

Detailed Advertising Information
 at Request

Accessory and Garage Journal
 Times Building, Pawtucket, R. I.

IMITATED
 BUT NOT
 DUPLICATED

**N O K A R B O N
 E A G L E I N E
 A U T O O I L**

THE OIL THAT SUITS
 AND DOES NOT SOOT.

Carbon in your cylinders means loss of power. Customers report 10,000 to 15,000 miles with no carbon troubles. A good motto: TRY ANYTHING. ONCE. EAGLEINE NO-KARBON AUTO OIL is furnished in 1-5-10 gallon, 30 and 50 gallon Steel Drums with faucets for which no extra charge is made.

**EAGLE OIL
 AND SUPPLY CO.**

104 BROAD STREET, BOSTON, MASS.



Polarine

The Standard Oil for All Motors

MANY HOODS—ONE OIL

It does not help your motor to feed it an oil which burns up—becomes “shot to pieces”—before it has a chance to do its work of lubrication.

For real nourishment, fill your crank-case with POLARINE.

POLARINE stands up and keeps its lubricating body in the hottest cylinder. It is friction-proof and carbon-proof—the standard oil for all motors. For sale wherever you see the SOCONY sign—the sign of quality gasoline and quality lubricants.

STANDARD OIL CO., OF NEW YORK

Principal Stations:

New York
Buffalo

Albany
Boston

HOW MANY CARS CAN YOU NAME?
Each radiator represents a well-known car.
How many can you identify?



Buyers' Reference and Guide.

ACCESSORY MANUFACTURERS AND JOBBERS.

Alsten & Goulding Co., Worcester, Mass.
Auto Parts Co., Providence, R. I.
Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.
Times Square Auto Co., 56th St., at Broadway, New York City.

AIR COMPRESSORS AND TANKS.

Brunner Mfg. Co., Main Office and Factory, Utica, N. Y.; New York Office, Hudson Terminal Bldg., 30 Church St. (Brunner.)
Williams Foundry & Machine Co., Akron, O.

AIR PUMPS.

Gardiner Governor Co., 126 Williamson St., Quincy, Ill.,
Lipman Air Appliance Co., 199 Pleasant St., Beloit, Wis. (Portable, Stationary.)

ANTI-BATTLERS.

King Specialty Mfg. Co., Brookline, Mass.

ARBOR PRESSES.

Bartlett, Edwin E., 322 A St., Boston. (Greenerd.)

AUTOMOBILE ACCESSORIES.

Gemco Mfg. Co., 743 So. Pierce St., Milwaukee, Wis.

AUTOMOBILE LOCKS.

Clark Lock Co., 57 Eddy St., Providence, R. I.

AUTOMOBILE PARTS.

Gemco Mfg. Co., 743 So. Pierce St., Milwaukee, Wis.

AUTOMOBILES. (See Cars.)

AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

Motor Specialties Co., Waltham, Mass.

BALLS AND BALL BEARINGS.

Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1790 Broadway, New York City; 805 Woodward Ave., Detroit.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (R. I. V.)

Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)

New Departure Mfg. Co., Bristol, Conn. (New Departure.)

Norma Co. of America, 1790 Broadway, New York City. (Norma.)

BEARING METALS.

Bunting Bronze and Brass Co., 727 Spencer St., Toledo, O. (Bunting.)

BODIES—WOOD AND METAL.

Cotton, Inc., L. M., Boston, Mass.

Highland Body Mfg. Co., Cincinnati, O. (Highland.)

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

BRAKE BANDING OR LINING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Multibestos.)

Royal Equipment Co., 1378 Bostwick Ave., Bridgeport, Conn. (Raybestos.)

Standard Woven Fabric Co., Framingham, Mass. (Multibestos.)

Staybestos Mfg. Co., Lena and Armat Sts., Germantown, Philadelphia, Penn. (Staybestos.)

Thermold Rubber Co., Trenton, N. J.,

BRUSHES, WIRE.

Williams Foundry & Machine Co., Akron, O.

CABLE, AUTOMOBILE.

Packard Electric Co., The, Warren, O.

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARBURETORS.

Air-Friction Carburetor Co., Dayton, O. (Model C.)

Zenith Carburetor Co., Detroit. (Zenith.)

CARS—GASOLINE PLEASURE.

Inter-State Motor Co., 804 West Willard St., Muncie, Ind. (Inter-State.)

Metz Co., Waltham, Mass. (Metz.)

Nordyke & Marmon Co., Indianapolis. (Marmon.)

Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Scripps-Booth Co., Detroit. (Scripps-Booth.)

Stutz Motor Car Co., Indianapolis. (Stutz.)

White Co., Cleveland, O. (White.)

Willis-Overland Co., Toledo, O. (Overland.)

Winton Motor Car Co., 131 Berea Road, Cleveland, O. (Winton.)

CARS—GASOLINE COMMERCIAL.

Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)

Chase Motor Truck Co., 106 West St., Syracuse, N. Y.

Duplex Power Car Co., Charlotte, Mich. (Duplex.)

Federal Motor Truck Co., Junction and Leavitt Sts., Detroit. (Federal.)

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

Independent Motors Co., Port Huron, Mich. (Independent.)

Jeffery Co., Thos. B., Kenosha, Wis.

Lauth-Juergens Motor Car Co., Fremont, O. (Fremont Mals.)

Packard Motor Car Co., Detroit, Mich.

Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Sanford Motor Truck Co., Syracuse, N. Y. (Sanford.)

Signal Motor Truck Co., Detroit. (Signal.)

Sullivan Motor Car Co., Rochester, N. Y. (Sullivan.)

White Co., Cleveland, O. (White.)

CARS—ELECTRIC COMMERCIAL.

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

General Vehicle Co., Long Island, N. Y.

CHAIN LUBRICANTS.

Motor Accessories Inc., 749 A Boylston St., Boston. (Chain-Lub.)

CHAINS, TIRE AND ANTI-SKIDDING DEVICES.

Weed Chain Tire Grip Co., 28 Moore St., New York. (Weed.)

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

CIGAR LIGHTERS. (See Lighters.)

CONTROLLERS.

Pierce Speed Controller Co., Anderson, Ind.

CRANK HOLDERS.

King Specialty Co., Brookline, Mass. (King.)

CYLINDER CLEANING COMPOUND.

Bowling Green Sales Co., 42 Broadway, New York City.

Dyer Apparatus Co., Cambridge, Mass. (Oxy-Carbon.)

ELECTRIC LIGHTING EQUIPMENT.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FAN BELTS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

FIRE EXTINGUISHERS.

Pyrene Co. of N. E., 88 Broad St., Boston.

FORD AUTOMOBILE SPECIALTIES.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

FORD HOODS AND RADIATORS.

Superior Lamp Mfg. Co., 136 W. 52nd St., New York, N. Y.

FORD STARTERS.

Hunter Auto Supply Co., Hunter Bldg., 333 W. Madison St., Chicago, Ill. (Hunter.)

Walden Mfg. Co., 73 Commercial St., Worcester, Mass.

FUNNELS, AUTO.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GEARLESS DIFFERENTIALS.

Gearless Differential Co., 884 Woodward Ave., Detroit, Mich.

GEAR SETS.

Detroit Radiator Spec. Co., 961 Woodward Ave., Detroit, Mich.

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind. (Ross.)

GENERATORS.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

HEADLIGHT DIMMERS.

Chaney Co., L. F., Springfield, O. (Chaney.)

HEATERS.

Superior Mfg. Co., N. S. Pittsburg, Penn. (Superior Safe Garage.)

HORNS.

Garford Mfg. Co., Elyria, O. (Tuto.)

Lovell-McConnell Mfg. Co., Newark, N. J. (Klaxon.)

Sells Mfg. Co., 444 Dorr St., Toledo, O.

INSULATION.

Packard Electric Co., The, Warren, O.

JACKS.

Motor Specialties Co., Waltham, Mass. (Excel Auto.)

LAMPS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric Trouble.)

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Clamp.)

LEATHER GOODS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

LIGHTERS, CIGAR.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)

BUYERS' REFERENCE and GUIDE—Continued.**LIGHTING SYSTEMS. ELECTRIC.**

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Garford Mfg. Co., Elyria, O. (Dynalux.)

Hawthorne Mfg. Co., Inc., 5 Spruce St., Philadelphia, Penn. (Spotlights, Marine Searchlights, Pencil Flashlights.)

Malton Specialty Co., 775 Boylston St., Boston, Mass.

Motor Parts Co., 818 No. Broad St., Philadelphia, Penn.

LUBRICANTS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)

Continental Asbestos Corp., Worcester, Mass. (Spedolene.)

Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)

Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagleline No-Karbon.)

Harris Oil Co., A. W., 326 So. Water St., Providence, R. I.; 143 No. Wabash Ave., Chicago. (Harris.)

New York Lubricating Oil Co., 116 Broad St., New York City. (Monogram.)

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MotoRol, Non-Fluid, Kejex.)

Standard Oil Co., New York. (Polarine.)

Texas Company, 17 Battery place, New York City. (Texaco.)

Vacuum Oil Co., Rochester, N. Y. (Gargoye Mobiloil.)

Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETO COVERS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.

Elsemann Magneto Co., 32 33d St., Brooklyn, N. Y. (Elsemann.)

Marburg Bros., 1790 Broadway, New York. (Mea.)

Motor Parts Co., 818 No. Broad St., Philadelphia, Penn.

Spiltdorf Electrical Co., 98 Warren St., Newark, N. J.

MAILING LIST.

Trade Circular Addressing Co., 166 W. Adams St., Chicago.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

MOTORS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Michigan.)

Wisconsin Motor Mfg. Co., Milwaukee, Wis.

PATCHES, TIRE.

Braender Rubber & Tire Co., Rutherford, N. J. (Cementless.)

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

PRESSES. (See Arbor Presses.)**PUMPS, TIRE.**

Kellogg Mfg. Co., Rochester, N. Y. (Kellogg.)

PUMPS, VALVE.

Hill Pump Valve Co., Chicago, Ill.

RADIATOR CEMENT. (See Cements.)

RADIATOR & HOOD COMBINATIONS.

Superior Lamp Mfg. Co., 136 W. 52nd St., New York, N. Y.

REAMERS.

Harding Distributing Co., Boston. (Martell Aligning.)

RINGS. (See Piston Rings.)**ROAD BUILDING MATERIALS.**

Barrett Manufacturing Co., New York. (Tarvia.)

ROLLER BEARINGS.

Hyatt Roller Bearing Co., Detroit. (Hyatt.)

Norma Co. of America, 1790 Broadway, New York City. (Norma.)

SEATS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Racing.)

SEAT COVERS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SELF-STARTERS. (See Motor Starters.)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Sager Peerless.)

Hartford Suspension Co., 147 Morgan St., Jersey City, N. J.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SPARK PLUG CASES.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SPARK PLUGS AND IGNITERS.

Alsten & Goulding Co., Worcester, Mass. (Alding.)

Bosch Magneto Co., 223-225 W. 46th St., New York.

Gibson-Hollister Mfg. Co., Boston, Mass.

Milwaukee Auto Specialty Co., 705-711 Chestnut St., Milwaukee, Wis. (Centerfire.)

Spiltdorf Electrical Co., 98 Warren St., Newark, N. J.

Stonebridge Sales Co., 10 Wall St., New York, N. Y.

SPRINGS FOR AUTOMOBILE SUSPENSION.

Marburg Bros., Inc., 1790 Broadway, New York. (Marburg-Hagen.)

Tuthill Spring Co., 756 Polk St., Chicago. (Titanic Unbreakable.)

SPROCKETS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

STARTERS.

Motor Parts Co., 818 No. Broad St., Philadelphia, Penn.

TEST CLIPS.

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Universal)

THERMOS CASES.

Dover Stamping & Manufacturing Co., Cambridge, Mass.

TIMERS.

Motor Specialties Co., Waltham, Mass. (Bemus.)

TIME STAMPS.

Hoggson & Co., S. H., Thames Bldg., New York, N. Y.

TIRE ACCESSORIES.

Braender Rubber & Tire Co., Rutherford, N. J.

TIRE CHAIN GRIPS. (See Chains.)**TIRE PRESERVATIVES AND PROTECTORS.**

Braender Rubber & Tire Co., Rutherford, N. J.

TIRE REPAIR EQUIPMENT.

Stevens & Co., 373 Broadway, New York City. (Sampson Inner Tube Plug and Outfits.)

TIRES, CASINGS AND INNER TUBES.

Braender Rubber & Tire Co., Rutherford, N. J. (Braender.)

Federal Rubber Mfg. Co., Milwaukee, Wis. (Federal.)

Goodyear Tire & Rubber Co., Madison St., Akron, O.

Miller Rubber Co., Akron, O. (Miller.)

Polack Tyre & Rubber Co., 246 W. 59th St., New York City. (Polack.)

TOPS AND ATTACHMENTS.

Highland Body Manufacturing Co., Station P., Cincinnati, O. (Highland Coupe.)

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

TRANSFORMERS.

Packard Electric Co., The, Warren, O.

TRUCKS AND TRACTORS. (See Cars, Commercial.)**UNLOADERS.**

Gallon Iron Works and Mfg. Co., 116 East Main St., Gallon, O. (Gallon Eclipse Portable.)

VALVE LIFTERS AND RESEATERS.

Paro, H. G., Suite 718-719 Michigan Blvd., Bldg. 30 No. Michigan Blvd., Chicago.

VALVE TOOLS.

American Valve Tool Co., 589 Hudson St., New York, N. Y.

VIBRATORS.

J & B Mfg. Co., Pittsfield, Mass.

VULCANIZERS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)

Vanderpool Co., Springfield, O.

Williams Foundry & Machine Co., Akron, O.

WARNING SIGNALS.

Selas Mfg. Co., 444 Dorr St., Toledo, O.

WELDING OUTFITS.

Dyer Apparatus Co., Cambridge, Mass. (Dyer.)

Searchlight Co., 1012 Karpen Bldg., Chicago, Ill.

Waterhouse Welding Co., 3 Pelham St., Boston, Mass.

WHEELS, WIRE.

Houk Mfg. Co., 1709 Elmwood Ave., Buffalo, N. Y. (Houk Detachable.)

WRENCHES AND COMBINATION OUTFITS.

Coes Wrench Co., Worcester, Mass.

Lane, Will B., 180 No. Dearborn St., Chicago. (Unique Ratchet.)

Mossberg Co., Frank, Attleboro, Mass.

Walden Mfg. Co., 73 Commercial St., Worcester, Mass.

NEW YORK

CHICAGO

BOSTON

DETROIT.

Subscriptions:

The United States and Mexico,
\$1.50 a year; Canada and For-
eign Countries in Postal
Union, \$2.00 a year.
Ten cents a copy.

THE AUTOMOBILE JOURNAL

Remittances:

Should be made by Check, Draft,
Postoffice or Express Money
Order, or Registered Letter.
Money enclosures must
be at sender's risk.

William H. Black, Treasurer.

D. O. Black, Jr., Secretary.

AUTOMOBILE JOURNAL PUB. CO.

Published the 10th and
25th of Each Month.

Times Building, Pawtucket, R. I.

Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under Act of Congress of March 3, 1879.

VOL. XXXIX.

JUNE 10, 1915.

NO. 9.

PUBLISHER'S AND READERS' PAGE.

THE Index of Tours in the Ninth Annual Touring Number of the Automobile Journal, to be published July 10, is so compiled that it is possible for tourists to start from any given point and arrive on schedule at any destination in the United States or Canada, utilizing the routings presented. Every section of the North American continent that will attract tourists is dealt with. It will not be merely a sectional route book, but a route, guide, log and touring book, and will inform the reader where to go, what to see, and will show by illustrations the places of scenic and historic interest from the "pines of Maine to the palms of California." Each tour is given in graphic articles, is visualized by illustrations from rare photographs and authentic and accurate maps, and is indexed by carefully compiled tables of mileages in either direction, so arranged that a tourist can make combinations to suit his requirements.

Preparing the Car for the tour is a subject in which every motorist is vitally interested. Practical suggestions for inspecting, adjusting and repairing the components of the chassis will be comprehensively dealt with in special articles, as well as continuing to be a regular feature of the New Owners and Ford Departments. The articles will be supplemented by descriptions of time and labor saving tools useful in the overhaul of the car, as well as informing the new car owners, who may not be thoroughly acquainted with intricacies of the machine, how the parts can be disassembled and reassembled properly.

The New Owners Department is proving its worth, as is witnessed by the letters of indorsement received by the editor and the letters of inquiry included in the Correspondence section of the department. This issue contains a valuable compilation of the generally observed rules of the road, about which the new car owner must be thoroughly posted to avoid accident and to avoid unpleasant contact with the laws of the land. The next issue will present a unique and im-

portant series of photographs, illustrating 10 common causes of tire trouble, and suggestions as to how these troubles can either be avoided or the results thereof be repaired. This information will prove valuable to operators, especially during this season of the year when nearly every motorist is preparing for touring. The readers of this department should not neglect to read the articles describing the latest accessories placed on the market. They not only are intended to add comfort to motor operation, but to suggest appliances and equipment that in the majority of cases make for economy in maintenance and repairs.

Partial Table of Contents.

	Page
*De Palma Wins Greatest Race.....	17
*To the National Parks by Motor.....	25
*General News of the Industry.....	29
*Car Accessories and Equipment.....	33
Development of Auto Tires.....	38
*Practical Motor Car Repairs.....	39
*Plans New Crossing System.....	43
Digest of Recent Motor Laws.....	44
*Packard Produces a "Twin-Six" Motor..	45
*Jitney Service Continues to Develop....	49
*Clifton Again Heads Chamber.....	51
*Industrial Happenings and Comment....	52
*New Overload Roadster "Four" at \$725..	53
*Saxon Cars Show Great Economy.....	58
*Suggestions for the Ford Car Owners..	59
*Ford Car Accessories and Equipment..	63
*Practical Facts for New Car Owners....	66

*Indicates article is illustrated.

There Are Over 800,000 owners of Ford cars, according to recent estimate, and such an army of motorists demands a special department such as is maintained in the Automobile Journal. In this department there appears regularly a thorough discussion of the mechanical features of the Ford car, the methods and principles of operation and maintenance. Each installment is appropriately illustrated, and is prepared by one of the most thoroughly versed writers in the country. Those accessories which are designed especially for Ford cars are presented in this department, where the reader can ascertain what are the most practical and serviceable devices on the market at this time. The concerns represented are thoroughly reliable and worthy of confidence, as are the manufacturers mentioned in all sections of the magazine. The Buyers' Guide, on pages 12 and 13, inclusive, is also of value to those who are in need of anything new in cars, accessories and supplies or fittings. Special

attention will be given to your communication, if you mention the Automobile Journal when writing to advertisers.

Order Your Copy Early—Hundreds of motorists were disappointed last year, in spite of the increased size of the Touring Number edition. There will be no advance in price. Now is the time—today.

What's the Answer to the Blow-out Question?



But they can't save you from the expense and risk of blow-outs if they are not on your car

A BLOW-OUT is more than a nerve racking noise—more than the ruination of a tire—more than losing control of the car—it is a positive danger! It comes from the inside, from a bruised, weakened, brittle and lifeless fabric—the backbone of the tire.

The Miller Method prevents blow-outs by eliminating their cause—by retaining the natural vegetable wax and oil in the cotton fabric—by not deadening the life of the fabric during manufacture. Oil carbonizes at 240 degrees. The old method of tire building requires 287 degrees to vulcanize a tire. The Miller exclusive process vulcanizes perfectly at a low degree of heat. It makes a rugged unit of both fabric and rubber—without destroying the natural wax and oil of the fabric or burning the native toughness out of the rubber.

The result is a tire that gives you practical immunity from stone-bruises, and the blow-outs that follow.

Perhaps it does not interest you what is put into a tire. It's what you get out that counts. But you can only get out of a tire what has been built into it.

In every Miller Tire there is

- additional care used in compounding rubber;
- an extra price paid to procure exactly the right cotton fabric and rubber;
- added time spent to secure the very best workmanship;
- the "Miller Method" of vulcanizing that keeps the life in the rubber and retains the natural wax and oil in the cotton;
- a greater number of inspections to make sure that each part of every tire is perfect.

Together, these items make a big sum total that insures the purchaser of a Miller tire additional mileage, safety and freedom from irksome roadside repairs.

Go to the nearest Miller dealer. When he equips your car with Miller tires—you can put the blow-out question out of your mind.

The Miller Rubber Company, Akron, U. S. A.

Distributors in the Principal Cities

Miller
Geared
to-the-
road Tires

gear your car to the road, through mud, sand or slush. With Miller tires on your car you're in control. Its tread is an integral part of the tire and retains its safety features until the entire tire is worn out. The greater mileage you get from them will make your choice of Miller Tires an economy, as well as a permanent safeguard.

**MILLER
TUBES**

answer
the tube
question

**ALL THE LIFE
IN THE FABRIC
IS RETAINED IN
MILLER TIRES**



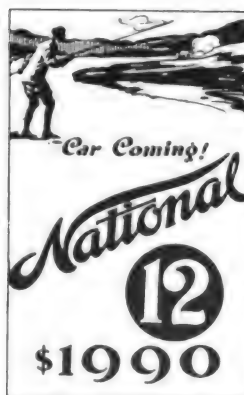
THE National dealer can go the limit in his praise of this new National "Highway Six" and when you have ridden in it you'll think him over-modest or tongue-tied. You'll ask "Why didn't you tell us it was so smooth-going and comfortable." Words cannot eulogize this new National any more than to say "Its performance is even better than its photograph."

We know what you are thinking—"That the staid, old conservative National Company has changed its policy and is following the example of many manufacturers by resorting to flagrant exaggeration"—but you are all wrong—

We are just as conservative as ever, if not more so. We have built a successful business for fifteen years without making false claims and we don't have to resort to any spasm of adjectives now. With us it is a matter of cold money-making, plain, business sense.

It's a ten to one shot—this new National "Highway Six" at \$1690! Heretofore, only one out of every ten buyers who were in love with the National car could afford to buy one—the others had to reconcile themselves to some second choice.

At that we were bought out this year many months ago and could have sold twice



our output. This is why we are continuing the successful, powerful \$2375 National Six. It is too big a success to drop.

But with the addition of the new "Highway Six," ten will buy a National where only one could and did, the past season.

Our capacity is going to be taxed to take care of those who can now afford to buy a National, *building them in the way we build cars*. We won't jeopardize the spotless reputation of National by any hurried or slipshod methods. We will build just so many of these cars, only such a number as we know we can build absolutely right. This is a National Policy—proven right by fifteen years of successful car building.

Phone the National dealer NOW. Have him demonstrate for you this new "Highway Six"—the car you must ride in to appreciate. If you don't know your dealer, write for booklet.

NATIONAL MOTOR VEHICLE CO., Indianapolis

For Fifteen Years Builders of Successful Cars

(When Writing to Advertisers Please Mention The Automobile Journal.)



ALL SPEED RECORDS BROKEN.

FROM every point of view the Indianapolis 500-mile sweepstakes on May 31 was the greatest race that had ever been put on at Indianapolis—and that means the greatest speed-way race that was ever run.

Ralph De Palma and his winning Mercedes finished the run at an average speed of 89.84 miles per hour, breaking by more than seven miles per hour the record set in 1914 by Thomas' Delage, which made a speed of 82.47 miles per hour. The first four cars to finish all surpassed the best speed of the year before by five miles per hour or more, and the next four cars nearly equalled it.

This startling result proves many interesting points. It shows that American drivers, like De Palma, and Anderson and Cooper, who finished

third and fourth, are in every way equal to their foreign competitors. It shows that the new small bore high-speed motors, with large valve capacity, are much faster than the old cars with engines twice the size and other parts in proportion.

As the winning car was a German production, many believe that foreign racing cars still are a shade better than those produced in this country.

But this conclusion is challenged by the remarkable performance of the Stutz team. With three brand new cars that had never been used before,

Anderson, Cooper and Wilcox, took third, fourth and seventh places. On two of these cars the bonnet was never raised during the race and they experienced not the slightest mechanical trouble.

It was the first time in the history of the race

TEN WINNERS AND THEIR PRIZES.

Car	Driver	Time	Speedway M.P.H.	Prizes
Mercedes.....	De Palma	5:33:55	89.84	\$22,600
Peugeot.....	Reata	5:37:27	88.01	10,900
Stutz.....	Anderson	5:42:27	87.6	5,600
Stutz.....	Cooper	5:46:19	87.11	3,700
Duesenberg....	O'Donnell	6:08:13	81.47	3,000
Peugeot.....	Burman	6:13:19	80.36	2,200
Stutz.....	Wilcox	6:14:19	80.15	1,800
Duesenberg....	Alley	6:15:08	79.33	1,600
Maxwell.....	Carlson	6:19:55	78.06	1,500
Sunbeam.....	Von Rautte	6:35:23	75.79	1,400



De Palma's Last Lap.

that three cars of any team, American or foreign, all won places. Stutz, this year, as last, was the first American car to finish. In the four races in which it has competed it has won seven places, another unbeaten record for consistent performance.

Though they came through the race without the least mechanical trouble, Anderson, whose average speed was 87.62 miles per hour, and Cooper, who made the course in 87.11, lost a great deal more time on account of tire changes than De Palma and Resta. These latter stopped at the pits only twice during the race. De Palma consumed three minutes and 23 seconds at the pits and Resta, three minutes and 19 seconds.

Anderson, on the other hand, was forced to make eight stops for tires and fuel, which cost him seven minutes and two seconds, while Cooper lost five minutes. Wilcox, whose Stutz was seventh, with a speed of 80.11 miles per hour, ran most of the race on three cylinders.

Conditions at the track were never more favorable and it is the judgment of experts that many years are likely to pass before the record set is again broken. It had rained a great deal at Indianapolis the week before the race, which had to be postponed on that account from Saturday, May 29, to Monday, May 31. The day opened with overhanging clouds. For that reason the bricks were cool and not so hard on tires as they often are, and the absence of bright sunlight removed the blinding glare of the bricks from the drivers' eyes, so that they could see perfectly and do their best.

The most thrilling feature of the race to the crowd of about 75,000 persons who were present, was the desperate duel between De Palma and Resta. Dario Resta,

skillful, determined, fresh from his victories in the Grand Prize and the Vanderbilt Cup, fought constantly to take the lead. At one time he skidded into the speedway wall and loosened his steering gear, so that he found it necessary to reduce his speed slightly or the result might have been different.

DePalma's Skill on Corners.

His Peugeot seemed to be slightly faster on the straight away, but De Palma's finished skill in rounding the corners

and his quick pick-up gave him the advantage on the turns. De Palma was in one of the rear rows at the start and it was only after 350 miles of constant struggle for position that he emerged in the lead and managed to hold it.

At the start of the race Resta, who was in the front row, took the pace, but held it for only one lap, when Wilcox in his Stutz went by him. He kept it for 10 miles and then Anderson shot in front and held the lead against all pursuers for 70 miles of furious driving. At 82 miles it went again to Resta. De Palma got the lead for a short period at 145 miles, lost it to Resta and regained it again at 175 miles.

As De Palma worked up gradually from position to position in the flying field, he was shown to be a warm favorite with the crowd, who cheered constantly for him. Many of them

SUMMARY OF THE FIFTH 500 MILE RACE

No. of Car	Name of Car	Name of Driver	20 Laps 50 Miles	50 Laps 125 Miles	70 Laps 175 Miles
1	Stutz	Wilcox	33:58.40	1:25:53.33	2:02:17.30
2	Mercedes	De Palma	33:56.45	1:24:10.78	1:58:11.30
3	Peugeot	Resta	33:54.38	1:24:08.78	1:58:53.85
4	Stutz	Cooper	33:58.90	1:24:46.26	1:59:12.30
5	Stutz	Anderson	33:21.90	1:24:52.10	1:58:29.20
6	Sunbeam	Porporato	33:55.80	1:26:39.45	2:02:05.25
7	Sunbeam	Graham	34:13.58	1:24:30.55	2:01:05.75
8	Peugeot	Burman	34:43.48	1:29:23.28	2:04:45.60
9	Kleinart	Klein	38:01.05	1:56:01.50	3:40:29.42
10	Duesenberg	Alley	35:42.26	1:28:56.00	2:04:04.69
14	Sunbeam	Grant	34:51.83	1:22:08.45	2:16:20.17
15	Duesenberg	O'Donnell	35:29.98	1:29:48.43	2:06:01.56
16	Peugeot	Babeck	35:38.76	1:28:41.63	2:05:35.15
17	Delage	J. De Palma	36:32.48	Out in 42nd lap; loose	
18	Sebring	J. Cooper	35:30.85	1:48:25.36	2:39:40.25
19	Maxwell	Carlson	35:29.45	1:28:30.93	2:04:13.89
21	Maxwell	Orr	35:31.48	1:28:31.33	2:12:19.60
22	Duesenberg	Mulford	36:24.08	1:43:34.28	2:21:43.21
23	Maxwell	Rickenbacher	34:00.03	1:24:26.18	2:20:32.65
24	Mals	Mals	48:37.65	Out in 24th lap;	
25	Purcell	Cox	Out in 13th lap;	timing gears	
26	Bugatti	Hill	39:25.94	Out in 21st lap; pump	
27	Cornellian	Chevrolet	39:25.26	1:41:15.28	2:51:08.72
28	Emden	Haupt	44:02.87	1:51:42.35	2:32:26.18

remembered his hard luck three years ago when he had the race won and broke a connecting rod in the 197th lap. He had established a reputation as one of the best of drivers who suffered unaccountably from the worst of luck and the crowd wanted him to break his hoodoo.

When he swept over the line a winner in by far the fastest time that has ever been made on the track, only he and his mechanic knew that hard luck had again tried to overwhelm him in the same fatal 197th lap. He had once more broken a connecting rod, which had punched two holes in the bottom of the crank case. But he was able to keep on with three cylinders and only a slight slackening of pace.

The pit work, as the result of steady practise at changing tires during the practise spins before the race, was better than it had been in any previous contest. Many tire changes were made in about 30 seconds.

Six Cars Make Fast Time.

After the first four leaders had come home it was nearly half an hour before the second group of cars began to finish. These were O'Donnell's Duesenberg, Burman's Peugeot, Alley's Duesenberg and Carlson's Maxwell. O'Donnell



Resta in His Peugeot.

made fifth place with a speed of 81.47 miles per hour, and Burman sixth, with 80.35 miles per hour. So that six cars of the 10 made better than 80 miles per hour.

Wilcox's Stutz was seventh, Alley's Duesenberg, eighth, Carlson's Maxwell ninth and Van Raalte's Sunbeam 10th. This car had much tire and hood trouble to delay it. The Emden was the only other car running and it was permitted to finish the race, making the distance at 70.75 miles per hour.

The first four cars to finish came through without the lifting of the bonnet. But trouble of many varieties affected others, some of which finished and some of which had to be withdrawn from the race.

Babcock in his small Peugeot had made only one stop for tires and seemed to be going very well when suddenly he cracked a cylinder and found it necessary to withdraw. Burman had three slight mechanical troubles. After three hours running the cover of his gear case came loose, but it was tightened in 30 seconds during a stop for tires and supplies. At the end of four hours it was necessary to change some spark plugs and then later the copper pipe which takes the oil to the camshaft broke and had to be bound with rubber tubing.

The Bugatti did not run well and was obviously under powered by the reduction made in piston throw to bring it into the race under the regulations as to displacement. Grant's car had not enough power to keep up with the terrific pace set, and when repairs to the mud guard became necessary it was plainly of no use to continue.

Porporato in his Sunbeam at times hit a pace up to 90 miles an hour, but his car

SHOWING TIMES AT VARIOUS INTERVALS.

100 Laps	120 Laps	150 Laps	180 Laps	200 Laps	Position at Finish
2:56:59.96	3:33:22.12	4:31:19.20	5:28:45.12	6:14:19.73	7
2:47:06.64	3:19:32.87	4:10:57.29	5:00:22.27	5:33:55.51	1
2:47:34.73	3:20:27.46	4:12:32.11	5:03:07.05	5:37:24.94	2
2:49:30.28	3:25:02.60	4:15:49.02	5:09:45.15	5:46:19.36	4
2:48:43.85	3:25:05.78	4:14:33.38	5:06:37.30	5:42:27.58	3
2:51:28.16	3:28:16.87	4:16:23.65	Out in 165th lap; broken piston.	6:35:23.43	10
2:55:03.24	3:41:42.52	4:33:33.78	5:42:21.55	6:13:19.60	6
3:03:10.11	3:38:03.93	4:44:06.69	5:37:31.50	6:13:19.60	8
4:43:04.23	Out in 112th lap; ruled off course for smoking.				
2:58:59.63	3:35:52.63	4:36:39.46	5:38:57.66	6:15:08.01	5
3:10:13.63	3:45:18.80	4:44:08.40	5:43:20.65	Out in 185th lap; withdrew; mud pan dragging.	
3:05:33.07	3:41:11.35	4:35:30.77	5:30:06.59	6:08:13.28	9
2:58:00.44	Out in 118th lap; cracked cylinder.				
flywheel.					
3:42:17.28	4:26:06.77	5:19:31.12	Out in 155th lap; wheel broken against wall.	6:19:55.97	
2:59:04.45	3:40:15.72	4:39:36.37	5:39:29.38	6:19:55.97	
3:07:03.40	3:43:49.69	4:44:07.29	Out in 169th lap; broken rear axle bearing.		
3:20:38.82	Out in 125th lap; broken connecting rod.				
3:18:19.80	Out in 102nd lap; connecting rod through crank case, automatically disqualified for leaving course.				
broken.					
gears broken.					
Out in 77th lap; valve dropped through piston.					
3:35:21.05	4:15:43.64	5:19:06.82	6:19:10.94	7:03:30.00	11



De Palma, First, Mercedes.

straps that held the bonnet of his car in place.

Von Raalte lost his hood altogether and was stopped by the officials, who insisted that he fetch it and put it on before he could continue. That caused the loss of a lot of time. He also had stops of 16 minutes and 19 minutes to fix the platform which carries the magneto on his car, losing, in all, nearly an hour at the pits.

The accident that caused Klein's Kleinart to leave the track was a new one for the racing drivers. The partition between his gasoline and lubricating oil tanks gave way and the two mingled. This greatly over lubricated his en-

gine and caused so much smoke that the officials were forced to rule the car off the track.

Cooper's Sebring lost 42 minutes because of spark plug trouble, and also incurred another stop to fix an accelerator pedal. Alley's Duesenberg suffered no mechanical



Resta, Second, Peugeot.

trouble except a loosened exhaust pipe. O'Donnell stopped his Duesenberg only three times and the only mechanical work done on the car was to replace a nut jarred from the brake bracket and a quick adjustment of one shock absorber. Mulford's Duesenberg was put out of the race by a stripped gear, but he had previously stopped to adjust his steering gear and brake.

Failure of spark plugs in Rickenbacher's Maxwell caused that car to withdraw. The plugs cracked soon after they were put in, apparently from excessive heat. Carlson's Maxwell was the only car among those that finished which stopped



Anderson, Third, Stutz.



Cooper, Fourth, Stutz.



O'Donnell, Fifth, Duesenberg.



Burman, Sixth, Peugeot.

only once. He suffered no mechanical trouble at all. Orr's Maxwell broke a bearing in the rear axle and was forced to retire from the race. The Maxwells with two valves per cylinder had no plug trouble, while that with four valves ate up plugs as fast as they could be put in. This will probably be remedied by

13th lap and was the first car to leave the race. The Mais was troubled with a flooding carburetor. On his second stop to fix it the driver overshot the pits and because he returned, leaving the track, he was disqualified.

The Bugatti, which proved to be very slow, broke a con-



Wilcox, Seventh, Stutz.

an improvement in cooling efficiency before the car again appears on the track.

The Emden proved to be a slow, but steady car, finishing in 11th place. It stopped only twice, once for four spark plugs and once for supplies.

John De Palma's Hard Luck.

John De Palma in his Delage ran at a good pace until his flywheel loosened and he was forced to leave the track. This accident was probably due to injuries the car sustained in a smash-up in practise.

The Cino-Purcell stripped a timing gear in the

connecting rod on the back stretch and was out of the race. The little Cornelian showed remarkable speed for so small a motor and went out after three hours because a valve broke and fell inside the cylinder. It was troubled also by overheating and several stops had to be made for more water.

As the first four cars in the race came through absolutely without mechanical trouble, that is an indication that racing cars have been so far perfected that in the near future mechanical trouble of even a slight nature will be equivalent to de-



Alley, Eighth, Duesenberg.



Carlson, Ninth, Maxwell.



Von Ranke, Tenth, Sunbeam.

feat. The winning cars, stopping only for fuel, oil and tires, cut the time lost at the pits to the minimum.

This was the first race run at the track in which no one was injured. This was due in part to the exceptionally favorable conditions and also to the new retaining wall, which prevented the cars from skidding off the track onto the soft ground and tipping over, as has frequently happened in previous years, with sometimes very disastrous results.

The race was a triumph for wire wheels. All the cars entered were equipped with them. All also were equipped with Bosch ignition. Seventeen of the starters used the two-spark plug type and seven had single plugs. Every car in the race was fitted with the Moto-meter radiator indicator.

Winners Used Silvertowns.

Each of the 10 cars to place was equipped with Goodrich Silvertown Cord tires. There was more variety in the selection of carburetors. De Palma's Mercedes was fitted with a Packard carburetor, Resta used a Zenith, the three Stutzes had Strombergs, the Master carburetor was used



Anderson at the Finish.

by Burman and the three Maxwells, and O'Donnell's Duesenberg was equipped with a Schebler.

For lubrication Oilzum was the most popular, practically all the cars using that oil. De Palma used Monogram and the three Sunbeams castor oil.

Overhead valves proved their efficiency by the fact that the first four cars to finish were equipped with them. In fact, 15 out of 24 starters used overhead valves.

The engines of the three Stutz cars were of this type and their performance for motors of entirely new design was entirely remarkable. The feat of Wilcox in running for hours with a broken valve spring and finishing in seventh place, speaks volumes for the efficiency of the new Stutz engine.

The striking performance of the Stutz is taken by technical experts as better proof than the chance winning of first place that American makers are able to design and build cars that will compare favorably with the best that the foreign makers can produce.

These new Stutz engines have nothing fundamentally new in design. They are the latest and most approved types worked out carefully with the best of material, and they show that American material and workmanship can equal any other.

In spite of the numerous handicaps under which the race was run from the commercial point of view, it proved to be an

FOUR PREVIOUS RESULTS.

The first Indianapolis 500-mile race was held in 1911 for cars of 600 cubic inches piston displacement. The purse was \$25,000. In 1912 the same size limit was in effect, but the purse was raised to \$50,000. In 1913 and 1914 the limit was cut to 450 cubic inches, but the prize money remained unchanged. The limit this year is 300 cubic inches. Winners of previous 500-mile races, together with their time and average are as follows:

Car	Driver	Time	Av.
1911			
Marmon.....	Ray Harroun	6:42:08	74.59
Lozier.....	D. Bruce-Brown	6:43:51	74.29
Fiat.....	Ralph Mulford	6:52:29	72.73
Mercedes.....	Spencer Wishart	6:52:57	72.65
Marmon.....	Joe Dawson	6:54:34	72.34
1912			
National.....	Joe Dawson	6:21:06	78.70
Fiat.....	Teddy Tetzlaff	6:31:28	76.60
Mercer.....	Hughie Hughes	6:33:09	76.30
Stutz.....	Charles Mers	6:34:40	76.00
Schacht.....	Bill Endicott	6:43:28	73.30
1913			
Peugeot.....	Jules Goux	6:35:05	75.92
Mercer.....	Spencer Wishart	6:52:57	72.65
Stutz.....	Charles Mers	6:48:49	73.38
Sunbeam.....	Albert Guyot	7:02:58	70.92
Mercedes.....	Theodore Pilette	7:20:13	68.14
1914			
Delage.....	Rene Thomas	6:03:45	82.47
Peugeot.....	Arthur Duray	6:10:24	80.99
Delage.....	Albert Guyot	6:14:01	80.20
Peugeot.....	Jules Goux	6:17:24	79.41
Stutz.....	Barney Oldfield	6:23:51	78.15

enormous success, as a money maker. The results will enable the speedway company to pay handsome dividends on its stock for the year.

The attendance figures checked from actual count went fully 25,000 over the mark expected by the officials when it became necessary on Saturday to postpone the race until Monday.

The constant rains for the days preceding the race prevented many people who had planned a motor tour to Indianapolis from taking their trips and the dark, lowering clouds on the day of the race itself kept many more from the field who doubtless would have come. Yet 75,000 persons attended the race, paying \$2 as an entrance fee and more for grandstand privileges.

Entrance Fee Was Doubled.

Last year the entrance fee was only \$1, yet the doubling of the price had little effect on the crowd, which certainly would have reached 100,000 had the weather been different.

These figures show why it has suddenly become possible to interest capital in the erection of motor speedways at Sheepshead Bay, Chicago, Detroit and Cincinnati. They are a remarkable tribute to Carl G. Fisher, whose commercial imagination and good judgment have made him a great figure in the motor world.

There were few men in the motor car or any other business who believed the ex-bicycle racer when he proposed the Indianapolis speedway years ago and advanced the argument that its one day's business a year would pay dividends on the investment.

But Fisher got the track built and the results have more than borne out his predictions. The owners of the track on the basis of this last result financially, are sure that they are on easy street for life.

Although other cities are now going into the speedway business, the Indianapolis course has a long tradition of great speed contests. Indianapolis is a small enough town so that a race is the big event of the year and the city at that time is the place of a great festival. The race is not lost there among a thousand other activities, as it may be in New York or Chicago. Furthermore, the fact that it will always be the first race of the year will maintain the interest in it.

Fisher the Big Leader.

Fisher is the head also of the company that is building the new track at Sheepshead Bay. It was his imagination and his ability to impart his enthusiasm to others that put the Lincoln highway on the map. He conceived the idea of the great national highway and interested in it the influential men who are carrying it to success.

He also first suggested the Dixie highway through the South, which has just taken definite form.

American racing has become distinctly the greatest racing in the world. The prizes are so great that practically all the European racing teams may be expected to compete as soon as the war is over.

SAFETY FIRST MEETING.

At the meeting of the traffic committee of the Safety First Federation of America at Detroit, June 4, which was attended by the leading traffic experts of the country, the following recommendations to be considered in the October meeting by the national association were adopted:

Uniform instructions in the education of traffic officers; standard signals for all traffic work; fixed location for all traffic officers; automobile parking time limit of from 15 minutes to an hour, to be regulated as municipalities desire; elimination of the glare of automobile headlights and sidelights. Standardization of left hand turns at street intersections; near side stops for street cars; abolition of all steps on horse drawn and motor trucks; guards on all chain driven motor trucks; standard size, color and attachment for all traffic signs.

Adoption of a standard plan of traffic lanes for pedestrians, as is in use in Detroit; standard ordinances covering traffic regulation; licensing of drivers of all motor vehicles; exclusive use of siren on police and fire department vehicles.

Police Commissioner John Gillespie, Detroit, was chairman of the traffic committee, and among the prominent attendants was E. P. Goodrich, consulting engineer of New York, and Frederick H. Elliott, secretary of the national federation.



E. P. Goodrich, Secretary Safety First Federation.

25,000 MILES BY MOTORCYCLE.

James Walker, otherwise known as "Safety First" Walker, head of the motorcycle department of the Weed Tire Chain Company, has travelled, on a motorcycle, with a side car, 25,000 miles during the past year, and is now outbound on another trip of 15,000 miles on a tour of the motorcycle trade.

Seven years ago Walker became a bicycle repair man and then a motorcycle race driver. He was a salesman for motorcycles in New York City and then took up the work of inducing motorcyclists to use tire chains.

He has convinced the manufacturers that they should make their forks wide enough to permit the use of chains and has been very successful in bringing the chain into use on motor-

ice of that firm by his grandfather and great grandfather. The firm is very old and very well established with the sort of people to whom the Scripps-Booth appeal is addressed, and it is planning to spend \$15,000 this year in advertising the Scripps-Booth in London.

INCREASES MILEAGE GUARANTEE.

The Pennsylvania Rubber Company announces that the mileage guarantee, to be used as a basis for adjustments on Vacuum Cup tires, has been increased to 6000 miles. This applies not only to tires that are to be purchased in the future, but to those which are now in use in all parts of the country.

This announcement follows the results of the tests of Vacuum Cup tires recently made by the Automobile Club of America, bought by club officials from dealers' stocks in widely separated parts of the country. Nine tires in this test made an average of 6760 miles, three of the casings exceeding 8900 miles.

The announcement further declares that on this basis these tires are from 17 to 22 per cent. lower in cost per guaranteed mileage than tires that are sold on a guaranteed basis of 3500 miles.

The Pennsylvania company's adjustments on the old basis have for some time been negligible and since earning their high certified average from the Automobile Club of America the tires have been further improved by a new toughening process, which is expected to add greatly to their wearing qualities. This makes the company sure that adjustments even on the 6000-mile basis will be very rare.



One of the Many Danger Signs Being Erected by Long Island Railroad to Help Reduce Number of Auto Accidents—The Company States That Large Proportion of Accidents Are Preventable.

cycles, where they are said to prevent dangerous skidding under all conditions.

Walker claims to have been the first motorcyclist to make the trip from Chicago to New York City with a motorcycle equipped with a side car and carrying a passenger. His passenger on that occasion was his wife.

SCRIPPS-BOOTH AGENCY IN LONDON.

The distribution of Scripps-Booth cars has been undertaken in London by Peters & Sons, Ltd., who for 125 years have been coach builders to the King, and who already handle the automobiles of Turcat-Mery et Cie of Marseilles, and the English Austin, cars that appeal to upper class English buyers.

Walter L. Bodman, the present general manager of Peters & Sons, was preceded in the serv-

BOSCH ON EVERY CAR.

Small capacity high-speed engines turning at a very high rate put an exceptional strain on ignition systems because of the great number of sparks required and the great exterior heat that is often generated by the motors. Vibration also is trying to the vital parts of the magneto.

To meet these conditions every entrant of a car at the Indianapolis races chose a Bosch magneto. It was the third big race of the year in which Bosch ignition was used exclusively.

TO THE NATIONAL PARKS BY MOTOR.

National Parks Highway Opens Simultaneously With Government Permitting Cars to Enter Yellowstone Park—Glacier and Mt. Ranier Parks Also Open.

TWO announcements of great interest to tourists are that the national government will open Yellowstone park to motorists on Aug. 1, and that the National Parks highway will be open to transcontinental traffic June 15. Motor tourists, accordingly, will be admitted to a vast new country of the richest scenic interest for the first time.

The roads through the northwest, from Chicago to Seattle, have in the past not been such as to attract the tourist, notwithstanding the scenic marvels, and the fine fishing and hunting along the route. At the same time the fact that Yellowstone park was closed to motor cars has removed one of the chief incentives for making the trip.

The northwestern cities—Tacoma, Seattle, Spokane, Butte and others—have realized the great future of automobile touring and the extraordinarily attractive features of their part of the country for tourists. They have therefore put forth the strongest efforts through their commercial and civic organizations to bring about the perfection of a good automobile route into their section.

In 1914, \$1,500,000 was spent on a main trunk highway by Minnesota, the Dakotas and Montana. Idaho, using rubble produced at its many mines, greatly improved the highway at large expense. Spokane county spent \$300,000 alone on improvement of the road. And in western Washington, particularly in the Cascade mountains, \$1,000,000 was spent on the same road.

This work completed the National Parks highway from Chicago to Seattle and on June

15 it will be formally declared open for tourist traffic. It will remain open until Oct. 1, after which date the weather is likely to render it difficult of passage until the next summer.

Hotels and garages are so frequent along the route that it is unnecessary to carry an unusually large amount of supplies on any part of the trip, and there is plenty of water available everywhere.

The method of taking travellers through Yellowstone park has been by stage lines. Roads have been constructed for these stages, but they lead around steep cliffs in many places and are so narrow that vehicles cannot pass each other.

The stage operators have maintained that it was impractical to admit motor cars, because, if one of them should break down on a narrow stretch of road, the entire traffic would be blocked.

But after a careful investigation the government decided that

while the matter was one of great difficulty, it was possible to admit motor cars. The date of the opening was postponed until Aug. 1, because stage traffic is expected to be unusually heavy this year and the greatest part of the rush will be over by that time.

The date also makes it possible to widen the roads in places so that vehicles can pass, and to perfect the traffic arrangements. These will be very strictly enforced. Cars will be obliged to start from the park entrance on a certain fixed schedule, leaving half an hour before the stage trips begin.

Each car will be inspected to see that there



Scenic Grandeur of the Grand Canyon of the Yellowstone.

is enough gasoline in the tank for the trip and that the car is otherwise in good condition. Telephones will be installed along the road so that

edges of the lake and stretch up nearly to the barren rocks of the mountain peaks.

On top of the mountains near Sperry glacier and Perry and Nansen lakes, the snow is always present. The trail from Sperry camp to Sperry glacier, a half mile further up, is hewn from solid rock in zigzag fashion. Sperry glacier is a great ridge like mass of ice covered with a thin crust of snow. Little brooks run from it and leap over the side of the mountain for a fall of nearly a third of a mile. It is 9000 feet above sea level. Gun Sight pass is a V shaped notch in the mountains on the continental divide.

Old Town is an abandoned placer mining camp near Lake St. Mary. Two Medicine lake is another body of water of great interest to the traveller. In all of these



Hart Lake in the Lake Chelan District of Montana.

if a break down occurs help can be secured at once. The traffic arrangements will be in charge of army officers. There is much of great interest in the Yellowstone mountains, rivers, geysers, hot springs, two large herds of buffalo and many wild animals.

Further along the trail the National Parks highway comes to Glacier National park, the largest of the national reserves and the last to open, and Ranier National park.

Glacier National park is 1400 square miles in area, the largest and latest of the national parks to be reserved as such by the government. It has mountains, lakes, glaciers and water falls of the most striking beauty. There are many wild animals roaming in the protected precincts of the great reserve.

One of the largest and most beautiful of the mountain lakes is Lake McDonald. The castellated peaks of the mountains are reflected clearly in the wonderful Prussian blue of its waters.

Another scenic wonder is the Royal Gorge. In it is a cascade a quarter of a mile long, through which the waters froth and tumble on a steep descent from Glacier lake. A dozen rainbows hang constantly over the stream. Avalanche lake, far up in the mountains, receives its water from the melting glaciers. The pines press close to the gray

lakes the mountain trout are plentiful and the fishing good.

New summer hotels of the Swiss chalet type have been built throughout the park and the most modern of comfort may be had at a reasonable rate.

The National Parks Transcontinental highway, which takes the tourist to the wonders of these national parks, is about 2500 miles long from Seattle to Chicago. It leaves the latter city along the shore of Lake Michigan as far as Milwaukee, and then turns west to Madison. Rocky country, noted for its many strange rock config-



Buck Creek Pass, Near Glacier Park, Cascade Mountains, Montana.

urations, is passed from Madison westward to La Crosse.

Minneapolis and St. Paul, the twin cities, are



Sunset on the Columbia River, Near Trinidad, Washington.

10 miles apart, the latter at the head of navigation on the Mississippi. Minneapolis was originally a milling town, whose flour mills were operated by power supplied by the falls of the Mississippi. Both cities are new by eastern standards. The first settler came to St. Paul in 1838. Minneapolis was not settled until some time later.

Out of the twin cities, across Minnesota and Dakota, the route goes through a splendid farming country. Minnesota is settled chiefly by Scandinavians. The flat plains of Dakota are covered with immense wheat farms, tilled and harvested on a grand scale by power machinery.

The route leads through the former cattle country in the eastern part of Montana, toward the Rockies. At Livingston a short branch road passes southward to Gardner, which is at the entrance of Yellowstone National park. At Butte are some of the largest copper mines in the world, which may be visited by the tourist. The continental divide is crossed just before Butte is reached.

From Butte the road goes via Deer Lodge canon and the Hell Gate river to Missoula. There are four possible routes from Missoula across Idaho, one of them touching at Kalispel, on the border of Glacier National park. Beyond the park the road brings the tourist to the marvelous canon of the Kootenai

and Pend d'Oreille lake, one of the largest and most picturesque fresh water lakes in the country.

Just before Spokane is reached the road goes through the famous Coeur D'Alene mining district, near which is Hayden lake, one of the new far western summer resorts.

Westward from Spokane, on very excellent roads, the route traverses the famous Washington fruit belt in the Wenatchee valley, and opens up the scenic attractions of the Columbia river to the tourist. It reaches Seattle on Puget Sound and from there it is possible to run south a few miles to Tacoma, not far from which is Mt. Ranier National park.

Plans for the summer cruise-meeting of the Society of Automobile Engineers have been completed. The attending members will leave

Detroit in the afternoon of June 14 aboard the steamer Noronic and will sail for three days through Georgian bay, returning in the evening of June 17. The narrow channels of the Thirty Thousand Islands will be traversed aboard the smaller steamer Waubic.

According to the programme of the cruise, the first day's business session will begin with the usual reports and the election of nominating committee members, and the balance of the day, as well as to the succeeding days, will be devoted to professional sessions. About 15 papers covering a very wide range of subjects will be read and discussed. The meeting is expected to be one of the most important ever held.



Along the Shore of Lake Harriet, Near City of Minneapolis.

CHALMERS USES OVERHEAD VALVES.

Paul Smith, sales manager of the Chalmers Motor Car Company, on his return from the race at Indianapolis, pointed out that the first four



Electrically Operated Warning Signal Recently Invented.

cars to finish had valve-in-the-head motors, with overhead camshafts, and that eight of the first 10 had motors of this character.

The new Chalmers "Six" has this type of motor. It is the first stock car in America to use the design, but Mr. Smith predicts that as soon as factory arrangements can be made it will be adopted by a majority of American makers.

NOVEL REAR WARNING SIGNAL.

A rear warning signal, designed to tell the driver of the car behind just what the man ahead intends to do, has been perfected by S. T. Warner of 37 West 58th street, New York City.

The signal consists of a cylindrical brass casing containing a glass cylinder. This glass cylinder is revolved at the operator's will by magnetic action, showing the signals "Stop," "Turn" or "Proceed." When the signal "Turn" is displayed an arrow indicates the direction in which the turn is to be made.

The turning signals are actuated by a steering wheel switch, which works automatically as the car is steered. The stop signal is actuated from a switch on the brake pedal and is flashed on whenever the brakes are set. An armature keeps the signal "Proceed" in place by gravity, and a series of notches enables the switch to be correctly operated without the driver taking his attention from the road. Current to operate the

device is drawn from the regular storage battery.

A modification of the signal has also been designed to give warnings at railroad crossings.

WHAT A LUMP OF COAL CAN DO.

The Barrett Manufacturing Company's exhibit at the Panama-Pacific Exposition is a graphic illustration of the possibilities contained in a lump of soft coal. A large block of coal is surrounded by its "children," among which derivatives are many that are very important in the automobile industry.

There is ammonium chloride, which is an important part of electric batteries; crude benzol, which the tire manufacturers use in large quantities, as do the makers of artificial leather; coal tar, from which is derived tarvia with which roads are surfaced, and which the Barrett company uses in its specification roofs, etc., and from which is obtained many chemicals that enter into the automobile industry in one way or another.

The list of things, as shown in the Barrett exhibit, that are obtained through various processes from a single lump of coal, exceeds that which can be derived from any other element dug out of the earth.

To teach Paige dealers thoroughly all the facts about the Paige car and the policy of the company, a correspondence school has been conducted during the past few months in which dealers are instructed on every detail. The second subject taken up was competitors' cars, and the third will be "Good Store Keeping." Prizes of



Barrett Manufacturing Company's Exhibit, Mines and Metallurgy Building, Panama-Pacific Exposition.

\$100, \$50 and \$25 each were offered for the best examination papers and over 375 dealers sent them in.

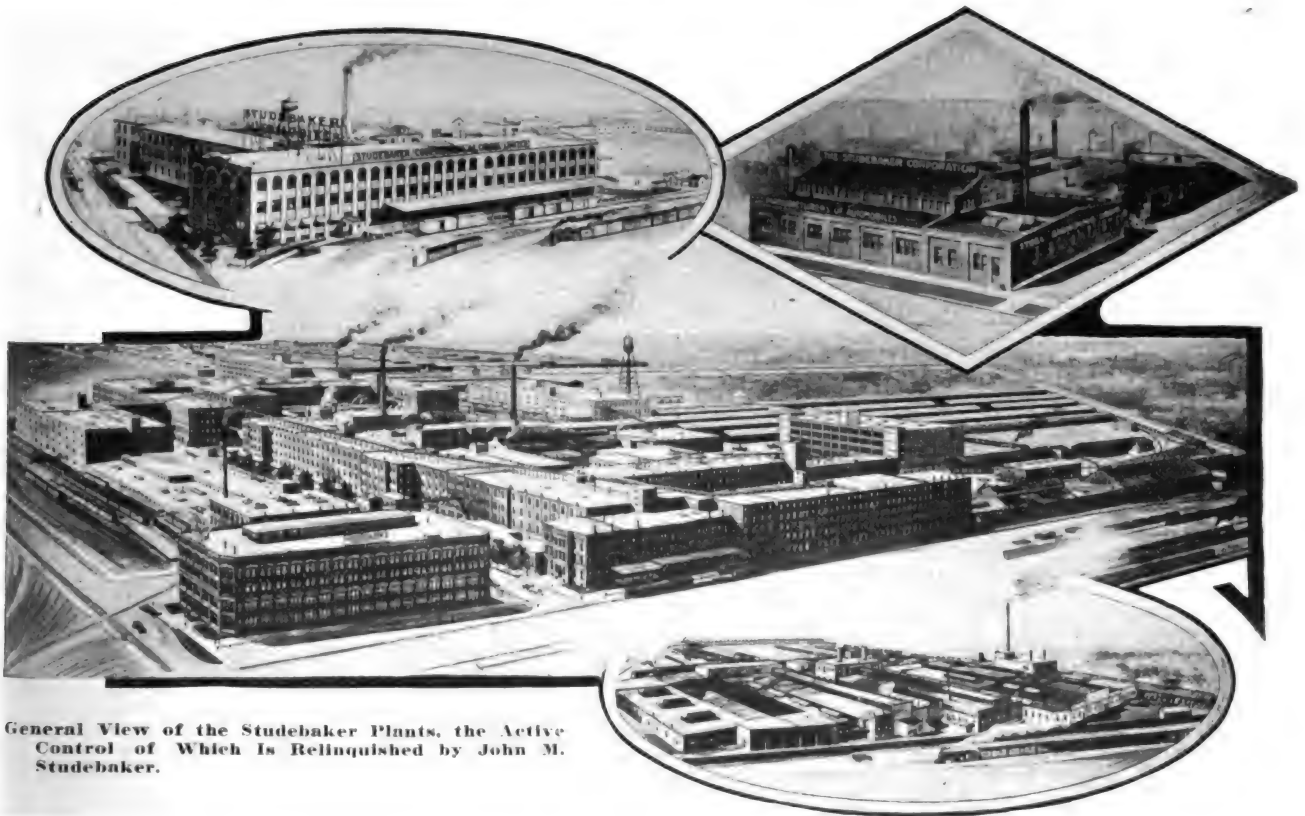
GENERAL NEWS OF THE INDUSTRY.

**Ford Increases Capital 5000 Per Cent.—Macauley Becomes Packard Director—
Studebaker Retires—Chalmers Activities.**

IN ORDER that the outstanding stock of the Ford Motor Company might more nearly represent the value of the company, according to James Couzens, vice president, the directors of the company at the annual meeting decided to increase the capital stock from \$2,000,000 to \$100,000,000. In addition to this the directors also decided to declare a \$48,000,000 stock dividend, pay-

\$27,840,000 of dividend; James Couzens, vice president and treasurer, \$5,000,000; David Gray, \$4,800,000; John F. and Horace E. Dodge, John W. Anderson and Horace H. Rackham, each about \$2,400,000. R. V. Couzens, the eighth stockholder, will receive about \$48,000.

The growth of the Ford company has been considered a miracle. The company's last state-



General View of the Studebaker Plants, the Active Control of Which Is Relinquished by John M. Studebaker.

able in July. This will bring the issued stock up to \$50,000,000. The remaining \$50,000,000 is to be kept in reserve for future dividends and the development of the company.

A cash dividend was declared, but the details were not announced. Last year the distribution was about \$10,000,000, or 500 per cent. on a capitalization of \$2,000,000.

Eight stockholders share in the stock "melon." They are Henry Ford, president, who holds 58 per cent. of the stock, and will receive

ment, Sept. 30, 1914, showed total assets of \$61,632,257.16, of which \$27,441,468.70 was cash. Real estate, buildings and fixtures aggregated \$13,000,000, and the balance sheet showed a surplus of \$48,827,032. This was in addition to a distribution of \$10,000,000 among employees effected by the profit sharing plan.

Since Henry Ford began manufacture of automobiles more than 812,000 motor cars have left his factories. For next year alone it is expected that 500,000 will leave the Ford plants. The

magnitude of the Ford organization can be understood when it is considered that there is at the present time approximately 21,000 persons on its pay roll, 18,000 of whom are employed in the Detroit factory.

MACAULEY IS PACKARD DIRECTOR.

The Packard Motor Car Company announces the election of Alvan T. Macauley as a member of the board of directors of the company. He succeeds J. W. Packard of Warren, O., inventor of the car and the man from whom it took its name. Mr. Packard retains his interest in the company.

A largely increased production for the year is predicted when the great plant is concentrated on the production of the



Alvan T. Macauley, Now Packard Director.

„Twin Six.” Cash on hand in the treasury is said to amount to \$6,000,000, so there will be no lack of finances for the prosecution of an active campaign.

Since Mr. Macauley came into the automobile business, five years ago, from the Burroughs Adding Machine Company, he has been slowly and carefully feeling his way, testing out principles and gathering information. The Packard company is now ready for the big drive that will accompany the launching of the “Twin Six.”

LAST OF STUDEBAKERS RETIRES.

According to an announcement recently made in Chicago, John M. Studebaker, the last of the five brothers who founded the Studebaker Brothers Manufacturing Company, now the Studebaker Corporation, will retire from active participation in the company's affairs in the near future.

Mr. Studebaker is 83 years old. He has been

at his desk regularly in spite of his great age. Fredrick S. Fish, president of the corporation, will take Mr. Studebaker's place as chairman of the board of directors.

A. R. Erskine, first vice president, will succeed Mr. Fish in the presidency. The post he leaves will be abolished. In speaking of the changes, Mr. Fish stated: “The present organization of this corporation is the best that it has ever had in its history, which is proved by the successes which have attended its administration.

The object of the changes is to perpetuate for the longest time possible a continuation of this happy condition. This necessitates a change in the charter, which it is expected will be effected on July 7 at a specially called stockholders' meeting for that purpose.”

OVERLAND'S NEW SALES DIVISION.

Joseph H. McDuffee has been appointed head of a separate division of the Willys-Overland company's sales department, which will confine its efforts to promoting the sales of the new Willys-Knight car, and conducting an educational campaign relative to its mechanical merits and technical features.

In this work Mr. McDuffee will be assisted by a corps of salesmen and technical experts. He has been a prominent figure in the automobile industry since its inception. He is said to have managed the first automobile retail store in America, in New York City, in 1898, and has been continuously on the selling end of the business ever since.

The new Willys-Knight, which will sell for less than \$1200, will shortly be announced by the Overland company. This model, an entirely new car in every respect, will be the first Knight engine car to be marketed for less than \$1400.

POPE COMPANY SOLVENT.

Shareholders and creditors of the Pope Manufacturing Company were agreeably interested in a statement made in the superior court at Hartford, Conn., by Arthur L. Shipman, counsel for Col. George Pope, receiver for the company in Connecticut. Attorney Shipman said that Receiver Pope had paid 45 per cent. dividends on the claims against the company and was ready to pay another dividend of 10 per cent.

In regard to the Massachusetts receivership of the Pope company, Charles A. Persons, one of the receivers, recently stated as follows: “The company's business and condition in this state is,

we think, in a very healthy condition. During the general depression, which is now ending, we ran much nearer normal than many other large plants, and our sales are picking up fast.



Col. George Pope, Receiver of Pope Company.

"February shipments were \$72,272; March, \$135,024, and April, \$148,464. As receivers, we started with no cash, and now have \$117,000 on hand. On April 30 our bills payable amounted to \$31,512, while our receivables, after reserve and suspense, were \$384,740. The

inventory has been reduced from about \$575,000 to \$387,000. General and factory overhead have been greatly reduced and everyone is busy."

NEWS FROM CHALMERS COMPANY.

Among the announced activities of the past fortnight in the Chalmers Motor Company, Detroit, Mich., is the statement that the company will give 100 hours of free service with the sale of every Chalmers car. The plan was inaugurated by Sales Manager Percy Owen, coincident with his promotion to the newly created office of general sales manager.

The service plan embraces the issuing of a book of labor coupons that will be negotiable at any one of the 800 Chalmers service stations, and without cost to the owner. Mr. Owen said: "We are putting service in black and white. We are putting it in a leather covered book where the owner of a Chalmers car can put his hand on it and receive car adjustments in exchange for a coupon whether he be in New York or Moline, in San Francisco or New Orleans.

Lee Olwell, vice president of the Chalmers company, is making an extended tour through the southwest, where he is conducting dealers' conventions. He reports to the company that, particularly through the agricultural and grazing sections, conditions are favorable for large motor car sales during the summer months.

To fill the vacancy created by the promotion of Percy Owen to general sales manager, Paul

Smith has been appointed to the office of sales manager, which position he entered upon on June 1. Mr. Owen in addition to helping direct the sales policies of the company, will also have sole charge of foreign sales and will supervise the Chalmers service department in its broader development.

Mr. Smith has been identified with automobile activities in many capacities since 1906, during which time he not only became well acquainted with more than 4000 motor car dealers, but produced good results in his sales campaigns for the Studebaker Corporation and the Lozier Motor Car Company.

WESTMAN GOES INTO BUSINESS.

E. E. Westman, who, for the past five years has been purchasing agent of the Cole Motor Car Company and the Premier Motor Manufacturing Company of Indianapolis, has severed his connection with the latter company to engage in business on his own account, under the name of the Standard Bearings and Parts Company, with headquarters in Indianapolis.

INCREASES CAPITALIZATION.

Papers were recently filed with the secretary of state at Lansing, Mich., increasing the capital stock of the Independent Motors Company, Port Huron, from \$60,000 to \$120,000. Of the new issue \$30,000 is preferred stock and has been subscribed by a number of well known Detroit capitalists.

The officers are: A. W. Frantz, president; B. L. Howes, vice presi-



E. E. Westman, Former Cole Purchasing Agent.

dent; Walter B. Ford, treasurer; M. H. Rupe, secretary. Board of directors: A. W. Frantz, J. J. Haynes and W. D. Smith of Port Huron,

W. B. Ford and B. L. Howes of Detroit.

The Independent Motors Company was formerly the Cass Motor Truck Company, and is building the Cass 1½-ton truck, and the Independent 1000 to 1500-pound worm drive truck. The output of the plant will be increased to meet the unprecedented demand for motor trucks for European war purposes, as well as the rapidly growing demand in the domestic field.

GOODYEAR STOCK FOR EMPLOYEES.

Stockholders of the Goodyear Tire and Rubber Company have voted unanimously to increase the common capital stock of the company and at the same time authorized the management to continue its policy of making "young partners" of its more efficient employees.

Stock to the value of \$1,700,000 has been set aside in the treasury for distribution to employees, and of this a quarter of a million dollars worth will be distributed at once. This is held in trust for the employee and the dividends upon it are allowed to pay for the stock at par.

This plan is believed to greatly improve the service given by the men, since they feel that they are working in their own interests directly as part owners and that the benefit of their efforts does not go exclusively to their employers. Under this policy the company has expanded its gross business from a few hundred thousand dollars a year to \$33,000,000 in 1914.

BUSINESS DIFFICULTIES.

A meeting of creditors of the Donnelly Motor Equipment Company has been called by Referee Seaman Miller to be held at his office, No. 2 Rector street, New York City, on June 17. This meeting is for the purpose of considering an offer for certain small parts and property belonging to the estate of the bankrupt company, the offer being from Cyrus W. F. Ely and amounting to \$55.

In the case of Chester T. W. Sutcliffe, doing business as Chester Demountable Rim Company, New Bedford, Mass., a special creditors meeting has been called for June 16, the business to be considered being the trustee's petition for leave to sell at private sale a certain patent belonging to the bankrupt estate.

The Kilgore Manufacturing Company, Portland, Me., has been adjudicated bankrupt, and the first meeting of the creditors will be held at the bankruptcy court room, Portland, June 18 for the purpose of proving claims, examining the

bankrupt, appointing a trustee and such other business as may be proper.

WILLYS GETS KNIGHT MOTOR EXPERT.

Henry H. Hower, for the past eight years with the F. B. Stearns Company, is the latest Knight motor expert to join the forces of the Knight division of the Willys-Overland company.

Mr. Hower is regarded as one of the best informed Knight engine men in the industry. While with the Stearns company he was successively manager of the service advertising and sales departments.

In addition to Mr. Hower, the Knight division has been augmented by Lawrence T. Wagner, former manager of the Argonaut Motors Company, San Francisco distributor for Stearns and Pathfinder cars. Mr. Wagner will make his permanent headquarters at San Francisco.

PEERLESS DIVIDENDS.

The Peerless Motor Company, Cleveland, O., has declared a regular quarterly dividend of 1½ per cent. on the preferred stock, and 3½ per cent. additional on account of accumulated dividends. Both dividends are payable July 1 to stock of record June 20. Dividends had been suspended April, 1914. This declaration places the stock on its regular seven per cent. basis, and makes up two of the four dividends which were unpaid. The official statement of the company contained no further information, but it is rumored that the balance of the accumulation will be paid off later this year.

LINK LEAVES PACKARD.

Vincent Link, for several years truck engineer for the Packard company, has taken charge of the engineering and drafting departments of the Standard Motor Truck Company, Detroit, Mich.

Mr. Link started his business career in 1900 and has been identified with various automobile companies since that time.

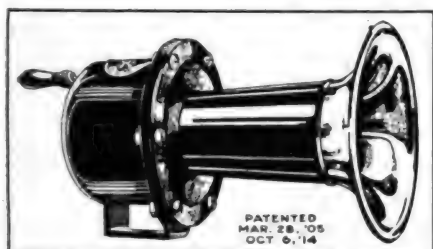
The Reading, Penn., plant of the S. G. V. Company, composed of Philadelphia and New York City capitalists, was sold for \$55,000 at a receivers' sale to Frank L. Metzler of Newark, N. J., member of the New Jersey Machinery Exchange. The sale was conducted by Robert E. Graham of Philadelphia, the receiver. It is rumored that the plant will be put into operation again.

CAR ACCESSORIES AND EQUIPMENT.

SEISS MECHANICAL HORNS.

Manufacturer Guarantees for 10 Years, Regardless of the Service Demanded, Its Model A Signal.

Among the claims which are maintained for the Seiss model A warning signal by its manufacturers, the Seiss Manufacturing Company, Toledo, O., is that it is one of



Seiss Model A Mechanical Horn.

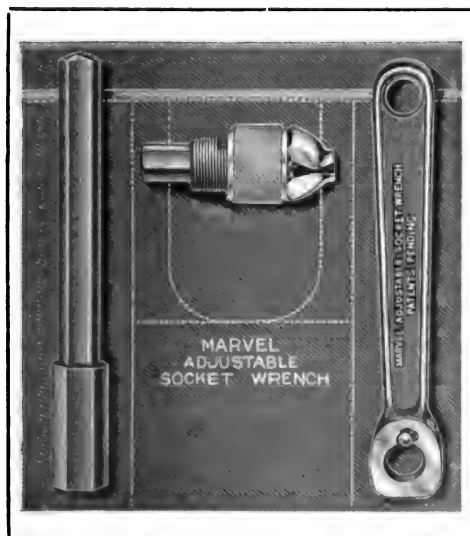
the most efficient and long-lived mechanical horns ever produced and has qualities possessed by no other make. One of the unusual features claimed is that it is double-acting, that is, it may be operated manually by turning the handle at the back in either direction. Being hand-operated, the tone can be modulated or intensified at will and at ease.

The horn has no springs and but three bearings. The sounding diaphragm is made of vanadium steel and the gears are machine cut and very accurate. Endurance of the contact point and the toothed wheel is obtained by heat treatment. In the fact that the manufacturer guarantees the horn for 10 years can be found his reason for claiming that it is long enduring. Any part found to be defective will be replaced free of charge if the horn is returned to the factory. It is finished in black enamel, baked to 300 degrees, with a highly polished brass or nickel bell, or entirely in black. The retail price of the model A horn is \$4.

MARVEL ADJUSTABLE SOCKET WRENCH.

A Single Tool That Combines All the Utility of a Large Set of Wrenches in the Convenience of One.

The Marvel Accessories Manufacturing Company, Cleveland, O., is marketing a socket wrench that provides the flexibility of service of a large set of wrenches and yet has the convenience of being composed of only three parts. Being in three parts, it is given the added utility of either the handle or the shank being used separately in conjunction with the socket. The entire tool is very compact, strong and neat in appearance, and it can be carried in a very small space.



Marvel Adjustable Socket Wrench.

Its assembly is simple and quick.

The head of the wrench includes the jaws, which are

clamped by turning a band, much the same as a bit stock chuck, and can be adjusted so that they will hold onto a very large number of sizes of nuts, of any shape, wherever located, and whether perfect or bruised. The head is adjusted and then the socket of the shank is slipped over the end of the band. The handle is placed over the end of the shank and with the very great leverage obtained a nut can be firmly set or loosened with comparative ease.

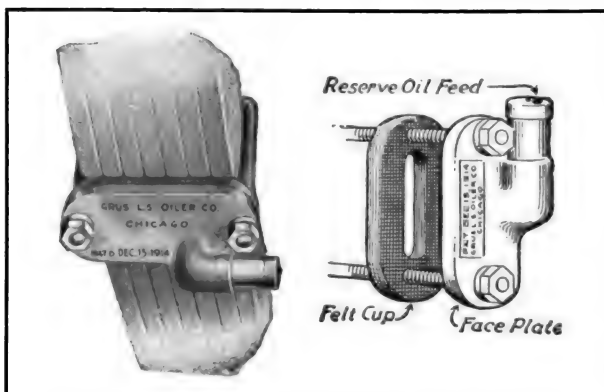
For working on nuts and bolts in inaccessible places, the handle and socket can be used without the extension shank. The wrench, as shown in the illustration, is sold at \$3. Further details can be obtained by addressing the company and mentioning this publication.

GRUS SPRING LEAF OILER.

A Lubricating Device Which Efficiently Distributes Oil by Capillary Action.

The Grus spring leaf oiler, a device made by the Grus Spring Leaf Oiler Company, 5213 Wayne avenue, Chicago, Ill., distributes lubricant to the springs through capillary action and it insures adequate lubricity as long as the oil lasts. It consists of three components, a face plate, a felt cup and a clip for which the face plate forms a yoke and by which it is attached to the spring.

The oiler is installed on the side of the spring assembly.



Grus Spring Oiler in Section and Attached.

bly, and the lubricant is supplied through the oil cup and is absorbed by the felt insert, which retains it until it is drawn into the spring by the separation of the leaves in service. The company makes the oiler in two styles, No. 1 having an oil cup on the face plate, and No. 2 having an oil hole. When ordering the thickness of the spring at the point of installation should be stated. A set of four oilers designed for use on Ford cars is sold for \$1.60.

AERMORE EXHAUST HORNS.

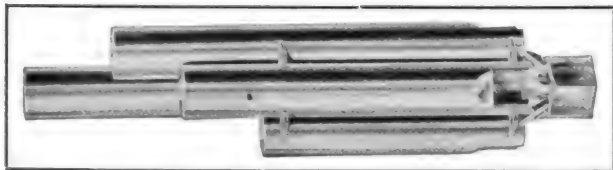
Multiple-Pipe Warning Signal of High Efficiency Produced by the Fulton Company.

Unusual efficiency is claimed for the Aermore exhaust horn by its maker, the Fulton Company, 726 National avenue, Milwaukee, Wis. It is a multiple-pipe warning signal, having a combination of four tubes of varying lengths, each causing a distinct tone. When all are used in combination they produce a clear, pleasing sound of great carrying power, which can be varied to meet any requirement, either low or loud.

While the horn is usually attached to the exhaust pipe between the motor and the muffler, a three-way connection being used, it also can be installed in other places. The manufacturer supplies it complete for installation with valve, foot pedal, wire cable and pulley and elbow connector. They can be fitted quickly and with ordinary hand tools.

CAR ACCESSORIES AND EQUIPMENT.

The Aermore horns are made to meet the requirements of different types and sizes of engines, so that in ordering, the make and model of the machine and the



Aermore Exhaust Horn.

outside diameter of the exhaust pipe where the horn is to be fitted are essential details. They are fully guaranteed and should there be need of correcting any condition that may be unsatisfactory, this will be done without cost to the purchaser. At request price and additional information will be supplied by the company to those who mention this publication.

CLERO HAND-OPERATED HORNS.

Efficient Mechanical Warning Signals Made in Two Sizes and Sold at Low Prices.

Clero horns, which are highly perfected types of hand-operated mechanical warning signals, are sold by the maker, the Fitzgerald Manufacturing Company, Torrington, Conn., to be unusually efficient and to have several advantages other than their low price. The highest grades of materials enter into the manufacture of these horns and for that reason the maker maintains that they are extremely long enduring, as well as that they afford a wide range of tones.

Slight pressure on the plunger located at the top, to be seen in the illustration, will induce a clear, low tone, which can be increased in volume and intensity by an increased pressure. The difference in the types marketed is mainly in the length of the projector, the shorter being sold for \$3.50 and the longer for \$4. In explanation of the low price the manufacturer states that it is possible through economical manufacturing facilities and a large production volume.



Clero Long Projector Horn with Penetrating and Far-Reaching Sound.

The company is now in the midst of an aggressive and national advertising campaign and is extending liberal co-operation to dealers and jobbers. Inquirers will receive prompt response if they mention this publication when writing.

JOHNSON'S PREPARED WAX.

A Prepared Wax Designed to Restore, Maintain and Make Weather Proof the Finish of Automobiles.

S. C. Johnson & Son, Racine, Wis., possessor of a national reputation as one of the leading manufacturers of high quality waxes for the polishing of delicately finished



Johnson's Weather Proof High Gloss Wax. having the quality of forming a thin protecting film, with a high gloss over the original finish. This film sheds dust and water, prevents cracking and checking and gives the vehicle the appearance of having been recently repainted or revarnished.

Even scratches from finger nails, shoe nails, or from other similar causes, fail to make an enduring impression upon the hard, dry and slippery finish imparted by the wax. Another notable feature is that it gives a glossy finish to a poor grade of varnish or paint equal to that production on the highest grade. Where the varnish has become rough or scratched, a perfectly smooth, new body finish can be built up on it, the wax filling up and concealing all crevices. It has extraordinary protective and preservative properties.

The wax is easily applied, the best results being obtained by allowing an interval of a half hour between each of several applications, and polishing each coat well. In a majority of cases it will be found that this treatment makes it unnecessary to have an old car revarnished. The price is very moderate, a pint can, costing 60 cents, containing enough for a season's use. A can containing a smaller quantity is sold at 25 cents each. The company announces that if the reader will mail the coupon published in its advertisement in this journal, together with 10 cents, it will supply by parcels post prepaid a can containing enough wax for one application on a large car.

RED ELEPHANT SPARK PLUGS.

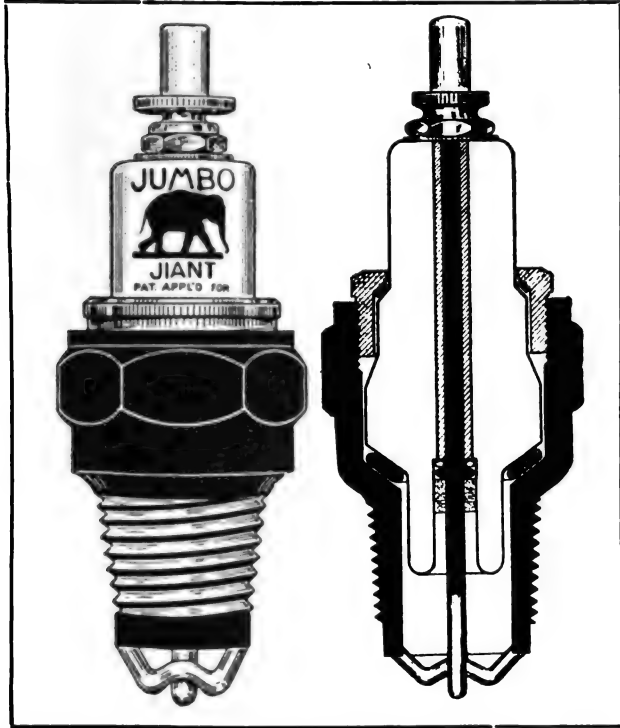
Five Types of Long Enduring Plugs—Guaranteed Products of Gibson-Hollister Manufacturing Company.

The Gibson-Hollister Manufacturing Company, Jamaica Plains, Mass., has given to five types of its Red Elephant spark plugs the trade designations of Jumbo

CAR ACCESSORIES AND EQUIPMENT.

Jiant, Jumbo Junior, Jinge Jiant, Jinge Junior and Jumbo Ford Social, they being, respectively, designed for use with high compression, high speed or heavy duty motors, with medium powered plants, and with small motors and Ford engines. These plugs conform to the S. A. E. standard, 1/2-inch, metric and special sizes. The plugs are sold with a guarantee of one year and that they will afford extreme economy and will endure longer than any others on the market. In addition to the five types indicated above the company also produces all standard sizes.

The manufacturer states that there are 16 mechanical reasons why the plugs are more enduring than any others. The cross section view of the Jumbo Jiant here-with discloses how the large shell retains the core in a manner that is new. Special insulation protects the heavy central electrode, which is retained by the flange at the base of the porcelain, where it is embedded in elastic cement, and by the nut at the top. The terminal of the electrode is adapted to fit any connection. The porcelain is seated in the shell in a heavy asbestos gas-



Red Elephant Jumbo Jiant Spark Plug Assembled and in Section.

ket and the bushing seats on a similar gasket, these providing compensation for the upward expansion and offering insurance against compression leakage. Downward expansion of the insulation surrounding the central electrode is prevented by an asbestos gasket.

The nickel steel central electrode will afford an extremely hot spark, will not burn and will prevent preignition. The shell electrodes are secured at both ends, so that they cannot be bent, and the slopes of the shell insure that all oil will drain from the points of contact and prevent fouling. The special finish of the shell is capable of enduring 1500 degrees of heat.

The Jumbo Jiant plugs sell for \$1 each; the Jumbo Junior, 75 cents, except when constructed of mica, which entails an additional 25 cents; the Ford type sells for 75 cents, porcelain, and \$1, mica, and can be obtained in sets of four for \$2 and \$3 respectively. Mention of this journal will insure special attention when writing to the manufacturer.

NEW PEERLESS TIRE BOOT.

A Heavy Duty Blow Out Shoe Made by the Leather Products Company That Is Claimed to Be Very Enduring.

A new type of Peerless tire boot is now being produced by the Leather Products Company, Denver, Col., which is claimed to be superior in quality and endurance



New Peerless Tire Boot.

to any previously offered. The style of the boot is shown in the accompanying illustration. The very best grade of oak tanned leather is used, it being treated by a process that makes it impervious to water, so that it may be used in any condition without fear of it loosening and weakening the tire. The tread is reinforced with an extra thickness of elk leather, closely set with flat-headed steel studs, which withstand practically all wear.

The boot is guaranteed not to slip or creep on the tire and to afford exceptional service. It is made with hook or strap fastening and the prices range from \$1.40 to \$3. Prompt attention will be given those inquirers who mention this magazine when writing.

OHIO NO. 1 AIR COMPRESSOR.

An Exceedingly Well Made Air Compressor That Is Built for Hard Usage.

The Ohio Compressor Company, Cincinnati, O., is offering an exceptionally interesting proposition to the garage and vulcanizing trade in its new compressor, which possesses a number of excellent advantages. The machine shown in the accompanying illustration is a three by four single-cylinder, air cooled model, rated at 6 1/2 cubic feet per minute.

The company issues a descriptive circular which describes the machine very thoroughly, and in which the following merits are mentioned: Bronze lined adjustable main bearings; forged steel crankshaft; heavy enclosed crankcase with splash system lubrication; steel valves of the wing type bevel



Ohio No. 1 Air Compressor.

steel crankshaft; heavy enclosed crankcase with splash system lubrication; steel valves of the wing type bevel

CAR ACCESSORIES AND EQUIPMENT.

face, so designed that it is impossible for them to break and drop into the cylinders; accessibility of valves, each of which is easily removable for regrinding or cleaning, by the removal of its own brass cage; and ground cylinder, pistons and piston rings, instead of having the cylinder bored and reamed and the piston and rings turned in a lathe and finished with a file, as is the usual practice.

The descriptive circular of this machine will be mailed to those who write to the Ohio company, box 431, Cincinnati, O.

LIPMAN PORTABLE GARAGE PUMP.

Portable Equipment for the Garage or Repair Shop, Which Can Be Operated at Very Low Cost.

The portable garage air pump illustrated is manufactured by the Lipman Air Appliance Company, 199 Pleasant street, Beloit, Wis., and is listed as the model P4. It is mounted on a heavy four-wheel truck, the front



Lipman Air Cooled Portable Air Pump.

axle being pivoted so as to permit the cutting of the wheels when making turns and allowing the device to ride easily over rough floors.

The compressor is of the four-cylinder type and is operated from an electric motor by enclosed gearing run in graphite and oil. The motor can be supplied for any standard voltage and for either alternating or direct current, and the pump furnished with water cooling chambers for use in filling air tanks having a pressure capacity up to 250 pounds. The compressor illustrated is of the air cooled type, and has 15 feet of high-grade air hose fitted with a pressure gauge and a Lipman patent pressure relief valve for the reading of the tire pressure. The hose connects direct to the condenser, which is cast integral with the frame. A heavy flexible cable with detachable plug is fastened to the electric motor for connection with a lamp socket.

The body and gear are finished in light gray enamel, while the pump, motor, wheels and handle are black enamel. The manufacturer estimates that the ordinary cost of operating this device for inflating tires is about

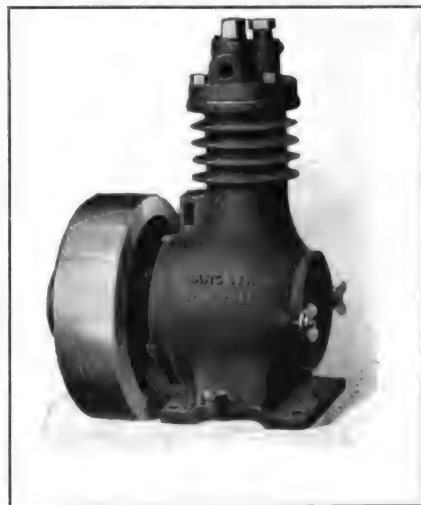
1/10 of a cent. A 34x4 tire can be fully inflated from flat in less time than two minutes.

GARDNER MIDGET AIR PUMP.

Useful Equipment Designed for Private Garages and Small Shops Where Moderate Pressure Is Wanted.

The Gardner Governor Company, Quincy, Ill., is manufacturing a power driven air pump known as the Gardner "Midget." The pump is one-cylinder, air cooled,

which can be tightly strapped to the floor. The pump shaft is fitted with a pulley which can be driven by a belt from any convenient shafting. Lubrication is by a splash system and it is claimed that all interior working parts receive a liberal supply of oil. The designer has made provision for keeping the oil away from the air chamber. This pump furnishes air direct to the tire, thereby eliminating a storage tank. The manufacturer warrants that the pump will develop 125 pounds for continuous working pressure. This pump should recommend itself to owners of private garages and shops where only a small volume of air is required. The retail price is \$16.60 with a tight pulley and \$18 when both tight and loose pulleys are supplied.



The Gardner Midget Air Pump.

DOVER ELECTRIC LAMP CASE.

An Especially Desirable Equipment for the Carrying of Spare Lamps Without Danger of Injury.

The Dover Stamping and Manufacturing Company, Cambridge, Mass., is making a steel case specially designed for the carrying of electric lamp bulbs, which is shown in the accompanying illustration. Such a device will be appreciated by owners of electrically lighted vehicles who have experienced loss through breakage of filaments through vibration, etc.

The case is made of heavy sheet steel without seams and measures 5 3/4 x 3 3/4 x 3 3/4 inches. It has capacity for two headlight lamps, two side light lamps, one speedometer and one tail light lamp. These are securely held by brace springs and a new locking device. The case is handsomely finished and has an automatic spring catch. The case is sold at retail for 75 cents.



Dover Electric Lamp Case.

TOURING ROUTES FOR ELECTRICS.

While some professional touring has been done with electrically propelled cars and a few private owners have tried it in a haphazard way, it has not been organized and most electric owners have been unwilling to undertake it because of ignorance regarding the location of the charging stations.

To overcome this condition the Goodrich National Touring Bureau, operated by the B. F. Goodrich Company, has issued an electric route book covering all the territory east of the Hudson river, the Harlem valley in New York and all of the New England states.

This book is called "Electric Motor Car Tours in New England." In addition to the usual detailed routing descriptions, it lists the location of each charging station. This information is also given in a diagram map included in the book.

In addition there is a very complete alphabetical list of charging stations compiled by the Electric Motor Car Club of Boston, which not only lists, but classifies, the stations. One class indicates stations of large capacity and full knowledge of electric vehicles, another showing good service, and a third, emergency stations.

The book makes it possible for the electric car owner to make extended tours through New York and to the popular resort districts of Vermont, New Hampshire and Maine. From the data given he can so arrange his trip as to stop every night in a town where a good charging station is located.

The book is distributed free and may be had by electric owners who apply to the B. F. Goodrich Company in Boston or New York City, or to the Electric Motor Car Club, 39 Boylston street, Boston, Mass.

TOURING FLOOD BEGINS EARLY.

Inquiries for routes and special information received by the headquarters of the American Automobile Association in Washington indicate that the great flood of motor touring which has been predicted for this year is already underway.

These requests indicate that the volume of touring during the spring has been vastly greater than in any previous year, and show that the im-

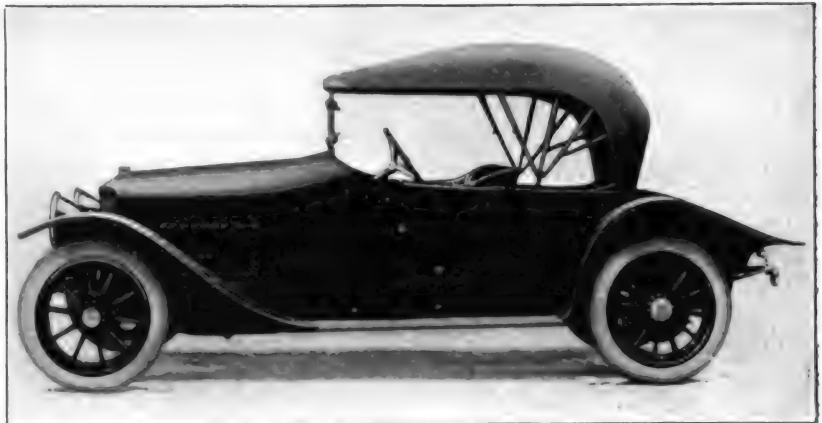
provement in roads, improvement and cheapening of cars, and the closing of Europe to visitors are having their effect.

Many requests indicate that students at schools and colleges who have previously gone home by train, will be met this year in many cases by motorist members of their families, who will take them home by automobile.

There are indications also that many of those who formerly confined their touring to the north-eastern section of the country will this year visit other sections.

PREMIER OFFERS NEW MODEL.

The new Premier three-passenger Cloverleaf model is one of the most distinctive roadsters now being manufactured, and it embraces several refinements that add to its comfort and conven-



The New Premier Three-Passenger Cloverleaf Roadster Model.

ience, as well as its serviceability.

It is of the conventional type for roadsters with an aisleway between the two front seats to the third seat, which is located back of the aisleway. The third seat is not of the make-shift type, but the same as those located in front in design and upholstery.

The one-man top is carried on a neatly painted body, and when up accentuates the smooth lines of the car. The flaring rear fenders add individuality, and the running board is left free of impeding tool boxes and the like. The deck has sufficient space for good carrying capacity.

There were 341,250 motor vehicles of various description in use April 1 in the United Kingdom of Great Britain.

Over 150,000 autoists are expected to register in Iowa this year.

DEVELOPMENT OF AUTO TIRES.

AMAZING as has been the development of the motor vehicle industry, that of the automobile tires presents almost a parallel. To all outward appearances the modern tire is not much different from that of the first pneumatic tires used on automobiles. As a matter of fact, as H. A. Githens, vice president and sales manager of the Federal Rubber Manufacturing Company, Milwaukee, Wis., states, many radical changes have been made.

"When one considers," states Mr. Githens, "the manner in which automobile tires are constructed today and the way they were when the automobile first came into existence, it is easy to realize why the tires of today are so perfect. The first automobile tires were practically nothing more than bicycle tires built on a larger scale. Since that time, however, many things have been accomplished that were not then known or understood. Today the tires made by most manufacturers are virtually scientific in the correctness of their design and the quality and proportion of their materials. We have learned that the tread requires a different kind of rubber than is used in the carcass—pliable, but toughened to withstand the greatest possible wear.

"It has been found that the tire giving the greatest wear and longest mileage with the least trouble is not a tire made with a tread so large and heavy that it soon loosens from the fabric. No matter how much rubber is put into the tread, if it separates from the fabric before it is worn out the tire is useless. Nowadays treads are made of the correct body and thickness to wear as long as the fabric underneath and this construction gives the greatest possible mileage. If the tread is made too heavy it will break the fabric. The tread and fabric must be perfectly balanced so that neither one is too strong nor too light for the other."

Mr. Githens adds that unless the studs or buttons on anti-skid tires are bevelled or graduated toward the sides so that the outer edge of the outside rows taper down to a height less than one-half of the centre rows, the middle studs, if made all of one height, will take the greatest wear and soon leave the centre row standing higher, with the result that when obstructions are hit or the tire becomes slightly deflated the outer rows are pressed back into the fabric, causing it to break and eventually blow out.

Another development in tires is the method

of application and demounting. "One seldom sees, nowadays, a person trying to pry off a tire with a screw driver, chisel or similar instrument," he remarks. "Demountable rims and straight wall type of tire have overcome this. In the Federal tire, for instance, the double cable base construction that we use to anchor the tire to the rim holds it so firmly that it cannot rock and either work off the rim or catch the inner tube beneath it and mutilate it. So firm and solid is this anchorage that even flaps are not required to protect the tube and yet the casing can be taken from the rim easily when desired.

"I believe that a great deal of credit should be given most tire manufacturers for the great progress they have made. When one realizes that this product of pliable rubber and fabric travels thousands of miles, not only supporting thousands of pounds, but also withstanding terrific friction and pounding over rough and rocky roads without broken fabric, loosened treads, rim cuts, blow outs, or, in fact, any troubles except the result of ordinary wear, accidents or abuse, it can be understood why most automobile tires as they are now made are scientifically correct in construction and must be perfectly balanced in every respect."

RUBBER RELICS SHOWN IN MUSEUM.

An interesting department of the Goodyear Tire and Rubber Company's plant at Akron, O., is a museum in which samples illustrating the development of the company and of the rubber business are shown. This is divided into three departments: Current Goodyear products, obsolete Goodyear products, and competitors' products. The displays include cross sections of all sorts of tires, rubber shoes and odd forms and shapes of crude rubber received in shipments.

An examination of the cross sections of tires shows the rapid progress that has been made in tire production since Goodyear tires began to be made 17 years ago. The first tires were solid. After that came the cushion type, solid tires with a small hole through the centre. This was followed by the pneumatic, which is shown in its highest development in the Goodyear power saver cord tires.

North Dakota expects to issue 22,000 automobile licenses during 1915.

PRACTICAL MOTOR CAR REPAIRS.

DRIVERS not mechanically trained do not understand that there are right and wrong ways of placing wires on a battery or coil ter-

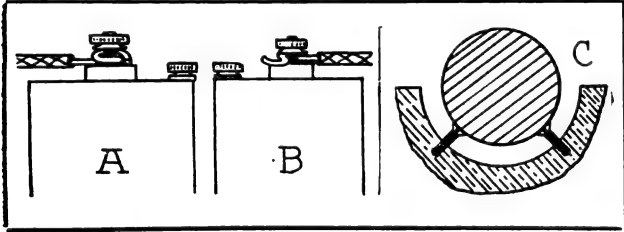


Fig. 50—A, Correct Turn of Cable on Binding Post; B, Incorrect Turn of Terminal Wire; C, Alignment of Shaft When Babbitting Bearings.

minal. The proper method of attaching a cable is to twist the bare portion around the post in a clockwise direction and then tighten the terminal nut. It will be noted by referring to Fig. 50 A, that the reason for this is that as nuts have a right thread, tightening tends to closer twist the wire to the terminal. If the wire be twisted in the opposite direction, as in Fig. 50 B, turning the nut to tighten it may uncoil the wire, so that the supposed firm contact is not tight and continued vibration of machine will loosen the nut.

BABBITTING BEARINGS.

Pouring babbitt linings in the bearing boxes is not difficult, but the preparation often entails much care to insure correct alignment of the shaft during the operation. The simple method illustrated at Fig. 50 C will save much time and labor in shaft aligning. This requires two holes drilled in the box about 90 degrees apart and about $\frac{1}{4}$ inch from the outside surface. Tap these holes for countersunk head screws. When the shaft rests upon the heads of these supporting screws it can be easily lined by raising or lowering either or both of them, according to the conditions. If the threads have been liberally coated with oil, the screws can be readily removed after the metal has been poured. This method also has the desirable advantage in that the shaft may be removed for heating purposes with the assurance that it will be in line when replaced.

REMOVING STUBBORN SPARK PLUGS.

Much difficulty is often experienced in removing a spark plug from a cylinder. Quite fre-

quently the porcelain may be cracked by a too vigorous application of a wrench, or by the wrench slipping. Care must be taken for breakage means the installation of a new plug. A certain and safe way to handle stubborn plugs is to loosen the retaining nuts and remove the porcelain cores, after which the gland may be handled easily, and as much pressure applied as is necessary.

REMOVING WHEELS IN EMERGENCY.

When the removal of a rear wheel is necessary the driver must borrow or buy a wheel puller. This is the best and most satisfactory tool to use, but in an emergency a wheel can be started by applying pressure to it and then striking the axle a sharp blow. When a puller is not available two men can remove a wheel by the method illustrated in Fig. 51. The hub cap and the retaining nut on the end of the axle should be taken off. One man should grip both sides of the wheel and pull it hard towards him, while the other strikes the end of the axle with a block of wood. Never strike the end of the axle with any metal tool, as this may damage the thread. Generally a few blows will loosen the wheel so that it can be drawn from the shaft.

AN ADJUSTABLE SOCKET WRENCH.

An adjustable socket wrench is a tool that is absolutely necessary in any repair kit. The wrench illustrated in Fig. 52 is not difficult to

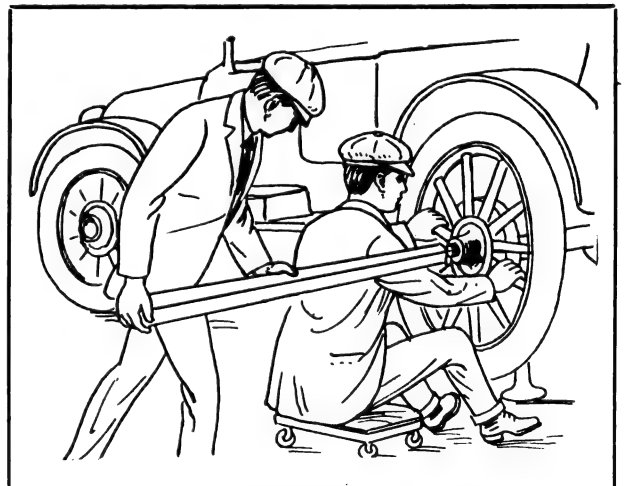


Fig. 51—Method of Removing Wheels from Axles Without a Puller.

make and is a very satisfactory tool wherever it can be used. To make this a strong piece of band steel is bent in the shape shown at "A." and in

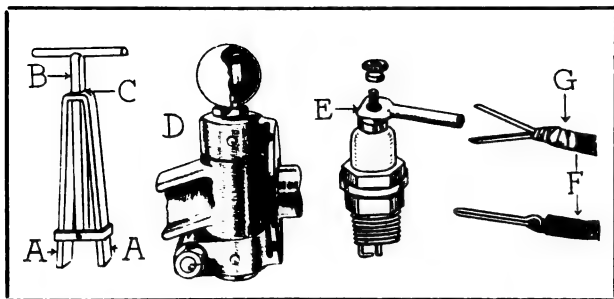


Fig. 52—A, B, and C, Members of Home-Made Adjustable Socket Wrench; D, Protection for Oil and Grease Cups; E, F and G, Components of Improved Quick Detachable Terminal for Wiring.

this is drilled and filed a square hole at the point "B." A square piece of iron "C" is then fitted in the hole and a band is riveted to the lower end of it. A handle is then welded at the top. It will be noted from the sketch that by applying pressure on the handle the wrench will adjust itself to the nut. This device can be made in various sizes to meet the requirements of the work and the size of the materials used can be varied to possess the requisite strength.

PROTECTION FOR OILER.

Many oil and compression grease cups are fitted on chassis where dirt and grease can accumulate about them. Unless very carefully removed some of this foreign matter may get into the cups and then be forced into the bearings. Very frequently mud will be deposited on the threads of the cups and obstruct the turning of the caps by which the lubricants are fed. A good protector can be made for any small oil or grease cup by obtaining an ordinary rubber ball and cutting a small round hole on one side. The ball can then be passed over the cup and the pressure on the collar or nut at the base will effectually retain it. The ball covers can be painted to match the chassis and are by no means unsightly. The illustration, Fig. 52 D, will serve to make the method of application clear.

IMPROVED CABLE TERMINALS.

Fittings that are trifling in cost and are used in numbers on chassis are often indispensable, and should these be lost or broken or badly worn, the driver may have to improvise what will serve until replacement can be made. The experienced motorist will meet conditions that

have caused failure and make temporary restoration with surprising cleverness, some of these repairs being so well done that they can be continued without change. An example of an improvised cable terminal is shown at Fig. 52 E, which is far more serviceable than merely wrapping the wire about a binding post.

A piece of copper tube is flattened for a half inch of its length, and in this flat section is drilled a hole that will fit the terminal to which it is to be attached. A cotter pin that closely fits the internal diameter of the tube is soldered to the end of the cable, as is shown at Fig. 52 F, and the end is bound with tape to insulate and strengthen it. The halves of the cotter pin are then spread slightly in the manner seen at Fig. 52 G, and when these are forced into the tube a very good electrical contact is made, and the pin can be withdrawn easily, although it cannot be shaken loose.

CLEANING ACETYLENE PIPES.

Those who operate machines equipped with acetylene gas generating systems are sometimes seriously inconvenienced through the piping from the generators becoming obstructed, wholly or in part, the headlights often failing or becoming inefficient when needed. Gas generation is not always a choice with owners, who, because of conditions, find that this system is the most positive to operate, especially if stations for the exchange of gas tanks are not numerous. Carbide can always be carried and with reasonable care the lights will afford good satisfaction.

Efficiency, however, can only be obtained by blowing out the piping at least once a week by attaching a tire pump to the tube where it is connected to the generator. When cleaning the pipe the burners ought to be removed so that particles of carbide may be blown out. Some oper-

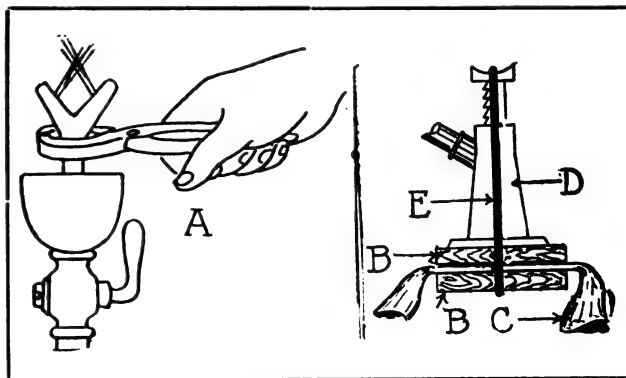


Fig. 53—A, Cleaning Acetylene Burner at Compression Relief Cock; B, C, D and E, Members of Improved Tire Tube Press.

ators fit sections of fine mesh screen over the outlet of the generator to prevent carbide from being carried into the pipe. When the burners

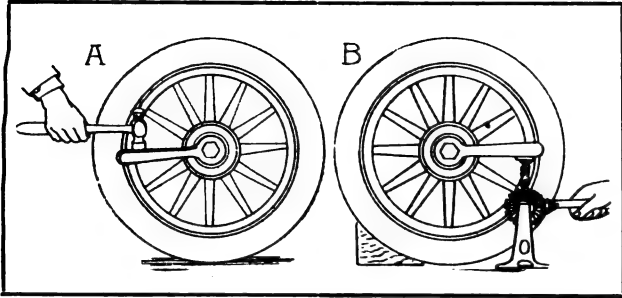


Fig. 54—A, Starting Hub Cap with Wrench and Hammer Blows; B, Using the Leverage of a Lifting Jack.

are obstructed they can usually be quickly and efficiently cleaned by holding them with pliers over the outlet of a compression relief cock while the engine is running, which will cause the pressure from the compression stroke of the engine to force the carbide particles through the burner outlets. This operation is illustrated at Fig. 53 A.

AN IMPROVED TUBE PRESS.

When making a roadside repair of a tire, it is often found necessary to subject the tube and the patch to pressure until the cement can thoroughly set. An easily constructed press for this purpose is illustrated in Fig. 53. Two blocks of wood (B), about four inches wide, six inches long and two inches thick, and an ordinary jack which forms part of the equipment of every car are required. After the patch has been carefully applied the tube (C) should be placed between the two blocks and the jack (D) mounted on the top block. A strong piece of cord or preferably wire (E) should then be passed around the blocks and over the head of the jack. By raising the jack the wire will be drawn tight and cause the necessary pressure for the repair.

REMOVING STUBBORN HUB CAPS.

The hub cap wrenches provided with the machines usually afford ample leverage, but starting a cap is frequently difficult. Repairers employ many means to loosen stubborn caps, the most common of which is that illustrated in Fig. 54 A. While the hammer may be effective in most instances, it is not a tool favored by the thorough mechanic, except for the purposes for which it is intended. By hammering the workman not only bruises the wrench, but he may injure his hand should the hammer slip.

A simple and more effective method is shown

in Fig. 54 B. If the cap should be on a rear wheel the brake can be applied which will lock the wheel, but should it be on a front wheel, a block can be forced against the tire to hold it. The wrench is then applied to the cap and the jack placed under the free end. By this method great pressure can be brought on the cap and it can generally be started. But should this fail the only recourse is to heat the cap thoroughly with a blow torch, taking care not to blister the paint. Kerosene should then be injected between the thread and the wrench applied before the cap has cooled.

HANDY PRIMING DEVICE.

An engine primer that will add much to the convenience of the driver can be made by anyone who possesses average mechanical ability. A small copper tank with a shut off valve fitted in its base should be securely fastened to the front dash. A copper pipe line should then be run from the valve to the intake manifold of the cylinders. Priming can then be accomplished without raising the hood and the gasoline will be taken into the cylinders in the form of gas, whereas priming directly into the cylinder introduces only liquid, which has to be mixed with air before it will become combustible. With this equipment when one wishes to start the motor all that is necessary is to open the shut off valve and allow a sufficient quantity of gasoline to run into the manifold. This device, which is illustrated in Fig. 55, will be an effective primer for engines that are equipped with starters.

REMOVING PIN FROM METAL.

Perhaps the most general method employed in removing a pin from metal is by the use of the stilson wrench. If the pin is firmly set, how-

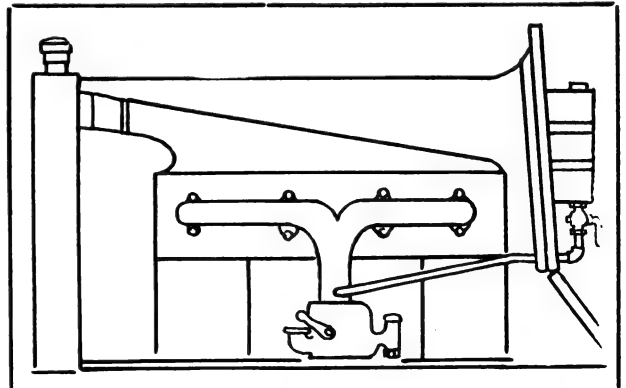


Fig. 55—Engine Priming System Designed to Supply Fuel to the Intake Manifold Above the Carburetor.

ever, that tool cannot always be successfully used, as the desired lift cannot be obtained. A method which ordinarily cannot fail to accom-

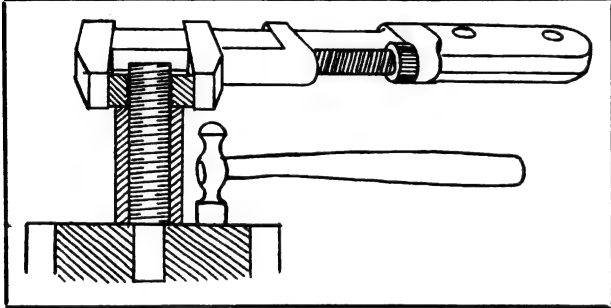


Fig. 56—Removing Pin from Metal by Means of Bushing and Nut.

plish its purpose is shown in Fig. 56. Cut a thread on the upper portion of the stud that sets above the surface of the metal. Place a bushing or sleeve over it and fit a nut to the stud. By screwing down on the nut the stud is forced to yield. If it should prove to be exceptionally stubborn, it may be advisable to tap around the base of the pin with a hammer.

MAINTAINING A CLEAR VISION.

Accidents frequently are due to the deceiving illusions caused by rain and mist settling on the windshield. Devices to prevent the accumulation of water are manufactured, but in the absence of any of these an inexpensive remedy is as follows: Mix equal parts of glycerine and kerosene and apply to the windshield with a sponge or brush. This prevents rain and mist from settling and fogging the glass, the drops immediately disappearing.

SOLUTION FOR PREVENTING RUST.

A mixture for the protection of steel against rust can be made of 16 parts turpentine and one part caoutchouc, dissolving these by a moderate heat. Eight parts of boiled linseed oil should then be added, the mixing being affected by bringing them to the heat of boiling water. The solution can be applied to the parts with a brush. It can be easily removed by using turpentine.

EXTINGUISHING GASOLINE FIRES.

It is not only futile, but often dangerous, to attempt to quench burning gasoline or kerosene by throwing water upon it. A positive and quick

method of suppressing such blazes is to spray either carbonate of ammonia or tetra chloride of carbon, these forming gases which almost instantly subdue the flames. The amount required is comparatively small. Of course, sand or earth thrown on the burning fluid will have practically the same result, but these elements frequently are not available.

EXTRICATING A DITCHED CAR.

Fig. 57 illustrates how one chauffeur extricated his light delivery truck after an accident that recently happened on a road that was in bad condition. The roadbed had caved in and caused his machine to drop down a steep embankment, finally resting on its side in a clump of trees and among some big rocks. These prevented the removal of the load in the enclosed body, and so, by unfastening the body bolts and using big bars, he pried the body off on to the ground.

Meantime a service truck had arrived in response to the chauffeur's call. A tackle, consisting of a strong cable with a ring at the centre, was rigged up as illustrated, one end being anchored on one tree, another on a post, while the other ends were attached to the disabled truck and the service machine. A double block was utilized to increase the strength of pull. The overturned truck was righted, and, because of the softness of the bank, a runway was made by using two planks. The service car was set in motion and easily hauled the delivery machine back on to the road. The body was emptied of its freight and pulled up in the same manner, and the boxes, barrels, etc., making up the truck's load, were hauled up by the same means.

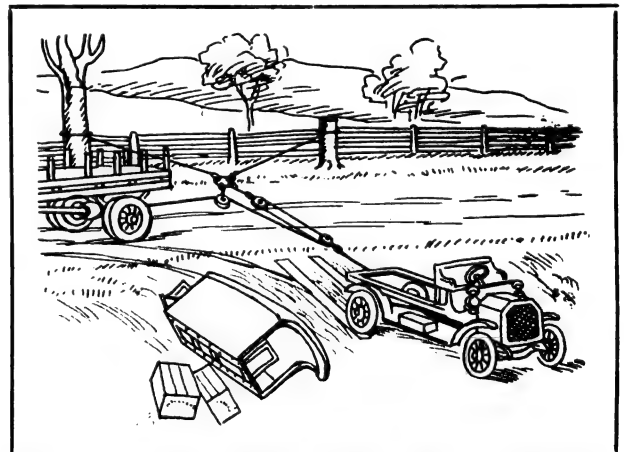


Fig. 57—Hauling Disabled Truck Back to Road with Tackle Arrangement.

PLANS NEW CROSSING SYSTEM.

THE prize of \$300 offered by the Municipal Art Society of New York City for the best plan to avoid congestion at the crossing of two heavily travelled streets has been awarded to John Floyd Yewell of Peekskill, N. Y. John Ambrose Thompson and Ernest F. Lewis of New York City took the second prize, \$200, and Calvin Kiessling and Herbert E. Davis of New York, the third prize, \$100.

The points on which the award was made was that the winning design was most simple and called for the smallest amount of destruction of existing buildings. The design has a tower in the middle of the intersection similar to the monument at Columbus circle in New York City. The corners of the buildings abutting are cut off to permit a circular movement of traffic. The car tracks on one street are depressed into a short subway to pass under the other street.

This plan makes it possible for the shops on the streets to be approached by vehicular traffic from any direction and would involve on that account no disturbance of property values.

The plan which took second prize was regarded as architecturally the best, but it made nearby shops difficult of access. The design which took third prize required no change except the arcading of the present sidewalks so that the space at present occupied by them could be used to enlarge the roadway.

It is interesting to note that of the interesting solutions offered all were based on the idea that to permanently solve the problem it would be necessary to resort to more than one level and double-deck the more important crossings.

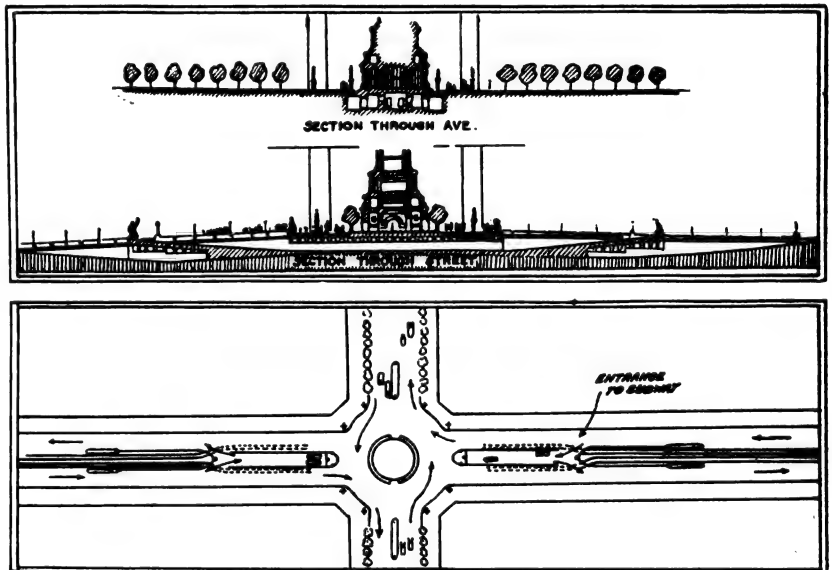
The leading officials of all the various New York departments who would be interested in an actual change of the kind contemplated acted as judges of the contest.

CONGESTION COSTS \$700,000 DAILY.

Because they believe that congestion in the narrow streets of lower New York City adds

from \$500,000 to \$700,000 a day to the city's charge for hauling expense, a citizens' traffic committee made an inspection of those streets recently with a view to recommending improvements that would at least minimize the danger to pedestrians.

The streets to which most attention was given are those like West street, leading to the Hudson river wharves. The result of the inspection will probably be that the committee, which is made up of influential men, will start a movement for the progressive widening of those streets.



Prize Winning Design in Municipal Art Society's Contest to Eliminate Congestion at Street Corners.

Some members held that the most practical immediate step was to convert the narrow streets at once to one-way traffic thoroughfares. Others proposed to remove the sidewalks on the ground that very few people walked through the streets, and therefore were unnecessary.

AUTOS KILL 30 IN MONTH.

Thirty persons were killed in New York City during May by automobiles. Of these 14 were under 16 years of age, according to the report of the National Highways Protective Association. Trolleys caused the death of five persons and horse drawn wagons of 11. Last year, in the corresponding month, 14 were killed by motor vehicles, 11 by wagons and two by trolleys.

DIGEST OF RECENT MOTOR LAWS.

MANY of the legislatures which have been grinding out motor legislation have adjourned for the year and the grist of legal news is smaller than usual, although court tests, and post mortems on the laws already passed have turned up many points of interest.

In Connecticut it has been discovered that the new automobile law accidentally omitted one feature of last year's bill, which is thought to be important and may later be re-enacted. This provides that cars operated under a livery or manufacturers' license shall carry the license number of the operator on the rear of the car. The police have complained that omission of this provision makes their work more difficult in the case of accident.

Headlight Dimming Laws.

In New Jersey the motor vehicle department has sent letters to the police of all municipalities asking co-operation in the enforcement of the new regulation requiring the dimming of headlights. The notice suggests that until owners have been given an opportunity to become familiar with the provisions of the law the police defer arrests and depend only on warnings.

Savannah, Ga., motorists have attacked in court the current regulations in that city, which not only require motorists to register with the state authorities and pay a license fee, but also that they again register with the city clerk. Georgia motorists object to the new state law on the ground that it imposes inequitable taxation and they are determined to test it thoroughly.

The public hack ordinance in New York, requiring that all cars used for hire should carry taximeters, has been enjoined by three taxicab companies, which claim that cars that they rent privately should not be required to carry equipment similar to that of cars that wander about the streets, or stop on public stands waiting for chance patrons.

Women Violate Law.

About 200 drivers, both men and women, have been arrested in St. Louis, Mo., for infraction of the new ordinance regarding the dimming of motor car lights. Some were charged also with failing to keep their rear lights burning. Each was fined \$5 and costs, but the fine was stayed on the promise of the offender not to repeat the offense. Costs, however, were collected.

New York dealers can drive their wives to the railroad station or even take them home

while using the ordinary dealer's license tag, according to a decision recently made by a New York magistrate. The police had held this to be illegal and had arrested Thomas P. Patterson, a chauffeur of the A. Elliott Ranney Company, Hudson dealers, because he drove F. O. Brezner, vice president of the Hudson Motor Car Company, and his wife, to Grand Central station in a car carrying a dealer's license. It was the contention of the police that this license could be used only for demonstration trips. The judge held that the trip was occasioned by an official of the company going about the business of selling motor cars and that such use was covered by the license secured.

Liability Bill Defeated.

In Ohio the Terrel bill, making the owner of an automobile responsible for any accident it might cause, no matter who drives it, was overwhelmingly defeated in the Ohio house. Only 29 votes were cast for it.

Approximately half the jitneys have been forced from the streets of San Francisco, Cal., by a new regulation requiring a \$10,000 bond for each car. These bonds cost \$8 a month and 300 of the 600 jitney men operating in the city preferred not to take them out.

Jitney operators in New Orleans, La., have secured a ruling making it unnecessary to deposit \$5000 in cash or securities with the city as a bond. Automobile indemnity bonds for a like amount must be accepted instead.

RIGID TESTS FOR TAXICABBIES.

Every candidate for a position as driver of a London motor cab must meet very strict requirements. He has to answer satisfactorily a large number of questions regarding London topography and the location of all sorts of places to which a passenger may wish to go.

He must show by actual driving through traffic that his skill is equal to the requirements of London's crowded streets. He must also show a record for good character and pass a rigid examination as to physical fitness.

Drivers and conductors of motor 'busses, which operate on a fixed route, are not required to possess so intimate a knowledge of London. As regards character they must give the same assurances and must pass also the same physical examination.

PACKARD PRODUCES A "TWIN-SIX" MOTOR.

For 1916 the Packard Engineers Have Developed a 12-Cylinder Motor—Two Lengths of Chassis and 22 Body Designs.

TO MEET the demand for increased smoothness of operation and greater flexibility of service in pleasure cars, the Packard Motor Car Company, Detroit, Mich., has designed a 12-cylinder motor for the season of 1916. The company's engineers, and those persons who have ridden in the demonstration cars, pronounce the new model an unqualified success.

The new models are designated by the serial numbers "I-25" and "I-35," those numerals indicating the wheelbase measurements of the two types. Save in dimensions, the chassis of the two cars will be identical. The "I-25" model will

be significant in that the motor is composed of two six-cylinder blocks installed at an angle of 60 degrees on a single aluminum crank case. With this construction the starting motor, generator and water pump are located on the right side of the crank case. The valves are on the inside of the V and are operated by a single camshaft mounted directly above the crankshaft. The cylinders are staggered, the left block being set forward $1\frac{1}{4}$ inches, so that the connecting rod bearings may be placed side by side on the crank pins. This construction makes for accessibility and endurance. There is a separate cam for each of the 24



The Packard Model "I-35," Equipped with a Phaeton Body, in Which Is Installed the 12-Cylinder Packard Motor That Has Created a Sensation in the Motoring World.

have a 83-inch body space and the "I-35," a 93-inch space, and they will be equipped with 22 different body types, designed for every practical motoring service.

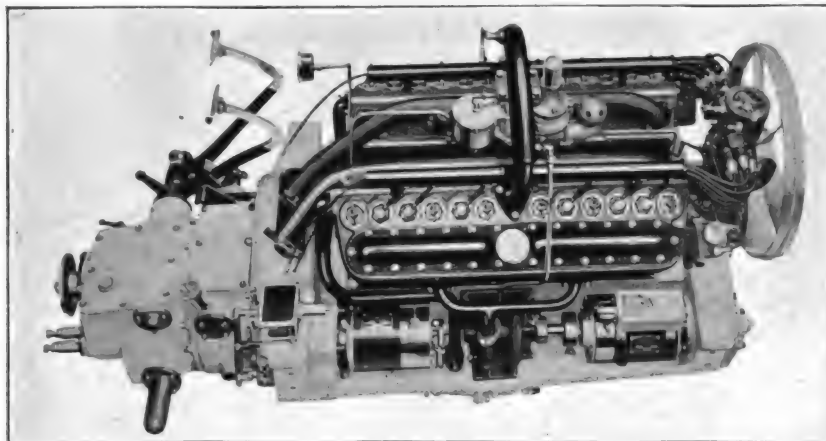
For the next season the Packard company has decided to abandon manufacture of its models "38" and "48" six-cylinder cars, the 12-cylinder cars being intended to take their places. No prices have yet been announced for the new models, though it is expected that they can be sold at remarkably moderate amounts.

The chief interest in the new types lies in the construction of the motor. For this the builders have adopted the name of "Twin-Six," which is

valves, operated from a single camshaft.

The dimensions of the cylinders are three by five inches, the 12 having a total piston displacement of 424 cubic inches. The engine has a maximum speed of 3000 revolutions per minute. There is a minimum of vibration in this 12-cylinder motor, due to the nearly continuous application of power, to the small bore of the cylinders, and the use of special aluminum alloy pistons, so that the reciprocating weight of the 12 pistons and connecting rods has been reduced to about half the weight of the corresponding parts in Packard six-cylinder motors. This smoothness of operation insures longer life of the bear-

ings and effects an economy in oil and gasoline. The pistons are fitted with the Burd company's high compression rings.



Right Side of Packard "Twin-Six" Motor Taken from Above to Show Valve Alley Between the Two Blocks of Six Cylinders Each.

The roller type tappets are adjustable. The 24 cams are formed integrally on a single hollow shaft, $1\frac{1}{8}$ -inch diameter, which is carried in three bearings and is driven by a silent chain, which also drives the pump and generator shaft. The ignition timer is operated by a worm gearing from the camshaft.

The crankshaft is carried on three main bearings and in this type of motor is shorter and lighter than is required in the conventional six-cylinder engine of equal power. The diameter of the bearings is two inches, while the length of the front bearing is approximately $2\frac{7}{16}$ inches, that of the centre three inches, and of the rear $3\frac{1}{8}$ inches. The push rods are accessible behind detachable covers, which run the full length of the cylinder blocks and protect the valve mechanism. The crank case is in two sections and is suspended by four arms from the frame. The lower section can be taken off without dismantling the bearings, or the clutch or front end covers. The mud pans are cast integral with the case and extend to the frame.

A 120 ampere-hour storage battery, which is charged by the motor generator, supplies current for ignition. A reserve battery is located in a water tight box on the frame left side member. A single ignition

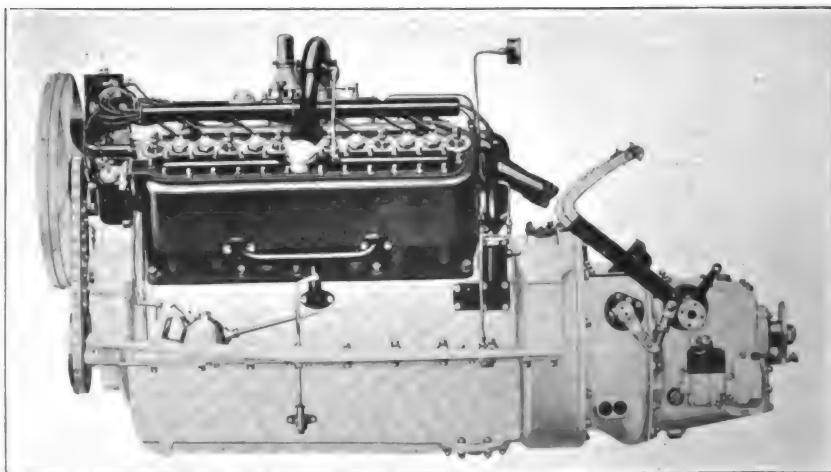
timer and distributor unit mounted at the front of the motor has a circuit breaker and distributor for each set of six cylinders. Both circuit break-

ers are operated by a common breaker cam mounted on a vertical shaft, which also operates both distributors and is driven at crankshaft speed from the camshaft. The result is a perfect synchronization, with great range of motor speeds. A plate glass box over the breaker mechanism affords means for inspection. Separate transformer coils for each bank of cylinders are sealed in water tight Bakelite housings at the front end of each motor block.

All high-tension wires are enclosed, and all ignition wiring has cambric wound cores; and which are practically puncture proof. Special Packard design plugs are used. In the base of the timer housing is a centrifugal governor which automatically regulates the spark advance for normal operation, and this is supplemented by a hand advance for extreme speeds.

The starting motor is a special Packard-Bijur design, and is independent of the generator. Operation is by a steady pressure on the starter button. The engine spins at from 100 to 110 revolutions per minute. The battery provided will crank the motor continuously for 30 minutes.

The carburetor is a Packard design and is mounted centrally between the cylinder blocks



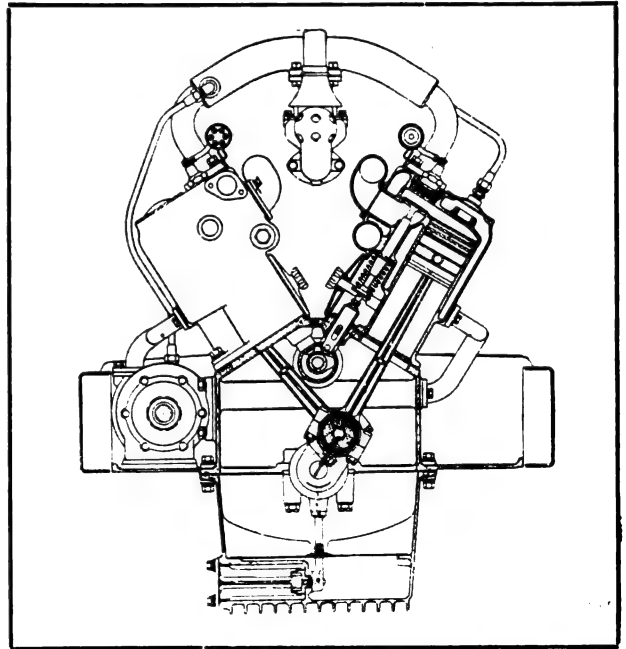
Left Side of Packard 12-Cylinder Motor Showing the Constructional Details of the Plant and Position of the Carburetor.

close to the exhaust pipes, thus obtaining a *natural* preheated intake. The gas is conducted to the cylinders by short and direct water jacketed intake manifolds, and is distributed to the individual cylinders through integral water jacketed manifolds extending the full length of the blocks underneath the valves. Air intake adjustments are interconnected and controlled from the steering column. Each block is provided with separate exhaust headers and pipes which join in the common muffler at a distance sufficient to prevent intermingling of gases. Gasoline feed is by pressure from a tank at the rear of the chassis. Pressure is by a two-cycle, motor driven pump, with a hand operated auxiliary pump for starting, mounted on the steering column.

The cooling system is of the constant temperature type. A centrifugal balanced pump is located at the right side of the motor and is driven by the generator shaft. When the water is cold the circulation is through the cylinder blocks and back to the pump by means of a by-pass manifold at the rear of the cylinders. However, as the motor becomes warm a thermostat automatically closes the by-pass and gradually allows the water to circulate through the radiator. In this way the water is kept at the temperature at which the thermostat is set, the thermostat also controlling the temperature of the entire motor to obtain the highest efficiency of operation. The monitor of the whole system is the Motometer on the filler cap, by which the driver can ascertain any sudden rise in temperature.

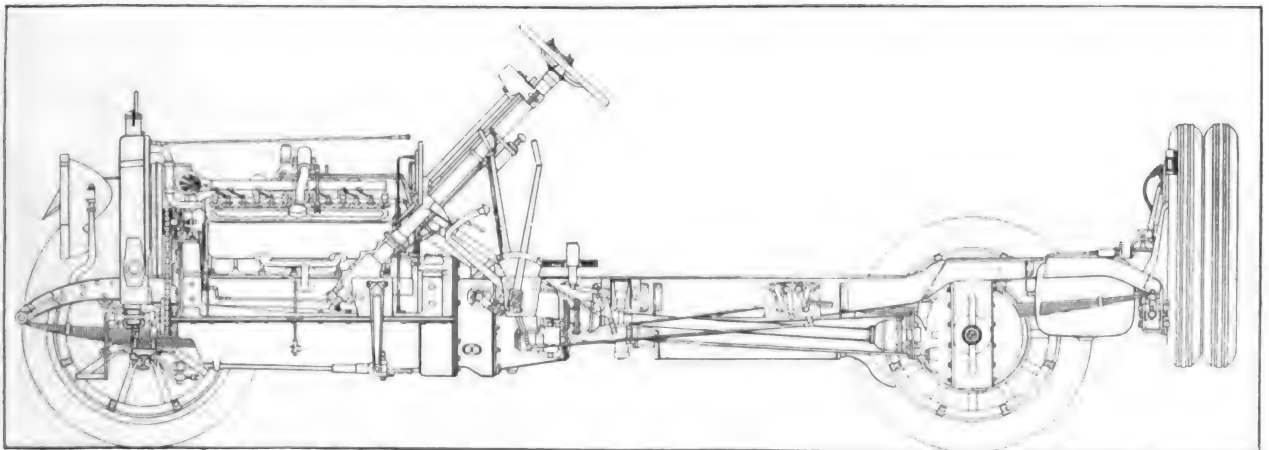
Lubrication is by a high-pressure system, a pressure of from 20 to 30 pounds being used for normal operation, with still higher head for increased speed. Distribution is positive, the large

bores of the crankshaft being supplied through the main bearings, while the camshaft obtains its supply through the front bearing. Tubes attached



Plan Section View, Showing Piston Details and the 60-Degree Pitch of the Cylinder Blocks.

to the connecting rods lead to the wrist pins, while the cylinder walls are oiled by overflow from the wristpins, as well as by the spray from the cranks. Mist rising from the crankcase through drilled holes lubricates the valve mechanism, while oil feeds supply the generator shaft bearing, the air and oil pumps and the timer drive shafts, and the front end chain and clutch shaft forward bearing. The pump is of the herringbone gear design, and is equipped with a regulator to govern oil pressure.



The Packard Chassis in Which Can Be Seen the Many Refinements Developed by the Packard Engineers for the New 12-Cylinder Models.

The clutch is the standard Packard dry plate type, consisting of six asbestos fabric-faced driving plates bearing against hardened and ground steel spider plates. The clutch unit has been shortened so that clutch and gear boxes are but slightly longer than those of Packard sixes. The transmission gearset case has been brought forward and is supported from the clutch housing, which construction is said to remove considerable unsprung weight from the rear axle and greatly improves the riding qualities of the car.

Included among the distinctive chassis refinements are a hollow rocker shaft for the clutch throw out yoke, which is lubricated through the end by a grease cup; a gearshift level equipped with a throw-over spring to assist in traversing



Front Compartment of the New Packard "Twin-Six," Showing the New Control Board, Etc.

the gate while changing from first to intermediate speeds, an interlocking system in the gearbox that positively locks the idle shifting member in neutral and simultaneously holds one set of gears in engagement; protection of the gearset ball bearings by stamped covers that rotate with the shaft; adjustment of linkage so that the foot brake action may be regulated to fit the conditions of driving.

The rear axle housing is pressed steel with nickel steel reinforcing tubes. Silent worm bevel gears give a quiet gear reduction, and the driving train from the clutch to the rear axle shafts is supported by ball bearings, which allow the car to roll or coast very easily.

A rigid steel stamped torque arm placed on

the right side of the drive shaft opposes the torque reaction of the motor and minimizes the tendency of the car to "heel over" when power is suddenly applied. The frame is of six-inch pressed steel channel section, which gives it strength and rigidity sufficient to prevent distortion and the resulting body squeaks. The fenders are of heavy sheet steel.

The improved three-unit type of spring suspension is used at the rear. No radius rods are used, as the drive is through the front half of the rear side springs. All spring bolts are provided with grease cups.

Internal and external brakes operate upon and within 17-inch drums, the bands and shoes being faced with asbestos fabric. The foot brake leverage is adjustable by changing the position of the connecting rod to any one of three holes provided in the lever at the forward end. Anti-rattlers are provided for the service brakes.

The car is driven from the left side, with left hand control levers. While the control board is smaller in design than previously used on Packard models, it affords full regulation of the lighting, ignition and carbureting systems. The engine starter button is at the driver's heel in the floor board. The accelerator pedal is at the right of the clutch and brake pedals, so that the foot assumes a natural position in operating it. Driving comfort is obtained by the steering post having a greater rake. The dash is made a part of the chassis, which greatly simplifies the changing from open to closed bodies.

The wheels are finished in Packard cream yellow with black striping, the bright metal parts being finished in nickel. They are equipped with Goodyear cord tires—36 by 4½ inches forward and 37 by five inches rear—as standard, but Kelly-Springfield or Goodyear fabric are supplied when specified.

The standard finish of the body specifies Packard blue, striped with Packard cream yellow. Equipment is complete and includes many refinements. In addition to one-man top and curtains fastening from the inside, there are on the doors curtain carriers, which telescope into the doors when not in use. Other equipment includes Sparton horn, Warner magnetic speedometer, Waltham clock with winding alarm, power tire pump mounted on the gearbox, and a tire carrier, which supports the extra tires from the rim.

Jitney drivers in Dallas, Tex., have contributed to a fund to fight local ordinances that effect them.

JITNEY SERVICE CONTINUES TO DEVELOP.

HARTFORD, CONN., reports that there were in the last week of May over 15 jitney suburban lines running out of the capital city to surrounding towns and cities. One of these extended as far as New Haven, approximately 40 miles to the south, covering the distance in two hours, at a rate of \$1.25 per passenger. The railway fare is 92 cents, and the express running time a little more than an hour. Another line ran to Springfield, making the trip in 90 minutes, at a fare rate of 50 cents, as compared with the trolley fare of 39 cents. These two lines, as well as the others that operate between towns nearer to Hartford, are carrying capacity loads and seem to meet the approval of the travelling public, though in many instances they are so greatly overcrowded as to be dangerous. The operators have in most cases adopted the zone fare schedules of the railway company.

A remarkable jitney association, with 1300 members, has been formed in San Francisco. It has co-operated with the council in the framing of jitney regulations and has approved an ordinance which would be regarded as strict in some places. It is provided that cars must be washed once a week and swept out every day. Brakes must be tested daily. Drivers must not smoke or drink. The police commission is given entire control and can make emergency changes in routes or regulations. The organization was perfected by union organizers and is very compact. There are two managers or walking delegates to keep the members up to standard in the service given, and to intercede for them in the case of any complication of any kind. Special arrangements have been made with supply companies by which gas, oil and other supplies are secured at special rates.

Licenses having been refused to drivers of jitneys from Brockton, Mass., who pass through neighboring Avon to Highland park, those operators have discovered a method of evading the local ordinance. When a Brockton driver reaches the town limits he removes all signs designating his car as a jitney, informs his passengers that

he has reached the end of the trip for which they paid, and then courteously invites them to continue to the park as his guests. Avon is now searching for a method of stopping the practise.

Because the railway officials refused their demand for increased wages with the statement that the jitneys of Akron, O., had so cut into the profits of the company, the counsel for the trolley men's union is working upon an ordinance, which if passed by the city council will affect the jitney interests with severity.

The recent restrictive measures adopted in Providence, R. I., caused some of the brighter



Six White "Jitneys" Sold Recently to a California Transportation Company.

drivers to develop plans whereby they could evade some of the measures. One measure prohibited jitneys from carrying more passengers than the seating capacity would accommodate, and to get around this some operators discovered that by removing the signs that advertise the car as a jitney they could ride unmolested and appear to be a private car. This placed the burden of proof that the car was operating for hire upon the policeman who must produce witnesses to the giving and accepting of fares.

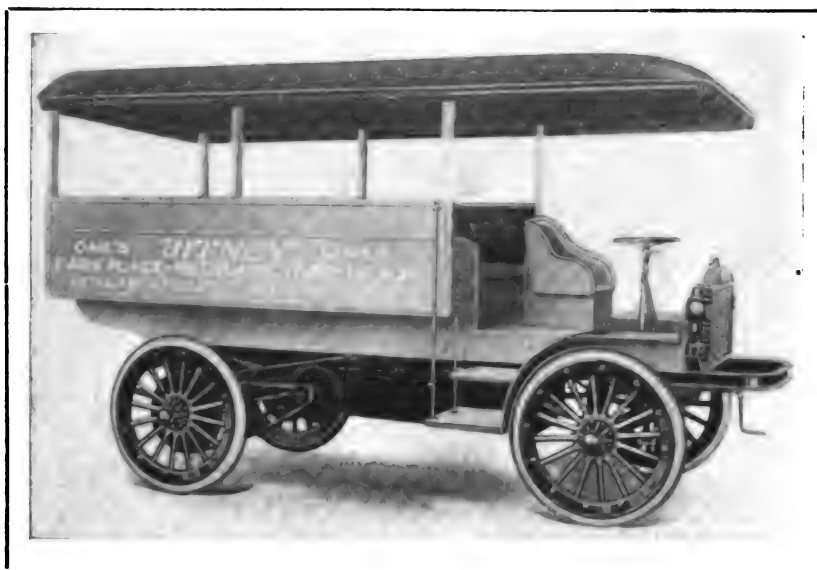
The White Company, Cleveland, O., recently delivered six White 'busses to the Peninsula Rapid Transit Company of California for the San Francisco-Burlingame-San Mateo run. These 'busses are of the pay-as-you-enter type and accommodate 24 passengers, there being three rows of splendidly upholstered chairs in the main

compartment of each 'bus.

The cars are lighted by electricity and are heated from the engine exhaust, thus providing for comfort in any condition of weather or temperature. The windows are arranged so that they may be opened in pleasant weather.

An unusual departure in this type of transportation vehicle is that in the White 'busses there is a smoking compartment in each car and a compartment reserved for women and children.

To meet the demands of pleasure seekers who travel from the Park Place railroad station in Newark, N. J., to Weequahic park, several Koehler jitney 'busses of the type illustrated have been placed in operation. It is a three-mile ride, and it has been figured that two tides of traffic would be encountered on each trip.



Pay-As-You-Enter Jitney 'Bus Operating in Newark, N. J.

The 'bus uses the standard Koehler one-ton chassis, and has a 14-passenger body, with the entrance on the right side forward, just behind the driver's seat, so that one man can operate the 'bus and collect the fares as the passengers enter or depart. The machine sells for \$875 with complete equipment, and is the product of the H. J. Koehler S. G. Company, Newark, N. J.

The new law recently passed in New York State makes it necessary for all persons desiring to operate motor 'bus routes carrying passengers for a fare rated under 15 cents in any city of the state, except New York City, to procure the consent of the local authorities and a certificate of convenience from the Public Service Commission.

With the showing of a number of moving pictures in Galveston, Tex., illustrating the de-

velopment of city transportation facilities from the horse cars to the modern electrics, was begun what is said will become a national campaign against the jitney 'busses. Taken by the San Antonio Traction Company, it is expected that they will soon be on exhibition throughout the country in the effort to win public support.

A bill is now before the Wisconsin legislature to place the regulation of the jitneys in the hands of the railroad commission. In spite of the assurance that the bill would practically delegate complete control of the streets to the commission, the jitney drivers are alarmed and are preparing to fight its passage.

The United States consul general of Canada, Frederick M. Ryder, reports that "the jitney autobus appears to be one of the most popular

conveyances in Winnipeg. This is of local construction, the body being 13 feet inside and five feet six inches in width, with head of eight feet. It is semi-opened at the sides, the upper portion being protected with curtains for use in inclement weather, and may be removed in fair weather, giving the appearance of an open touring car. Pneumatic tires are used on the forward wheels and solid tires on the rear, thus reducing the jolting from frequent stops to a minimum.

"These cars accommodate 18 passengers and have spring seats upholstered with leather. The car is lighted with two electric dome lights in the ceiling. The

word jitney is picked out in electric lights at the top of the bus, a green light indicating empty seats and a red light that the car is filled."

It is very important on large 'busses for use in "jitney" service that left drive and control should be used. As all cars have to stop with the curb on the right hand side, left drive makes it possible to have an entrance at the front end of the car directly opposite the driver. This enables one man to operate the 'bus and may make the difference between the success or failure of the undertaking. This was one of the considerations that led the Packard Motor Car Company to use left drive on its new worm drive trucks.

In 1914 the United States supplied to the Philippine Islands, vehicles valued at \$666,000, of which automobiles were the chief item.

CLIFTON AGAIN HEADS CHAMBER.

THE election of officers of the National Automobile Chamber of Commerce at its annual meeting in New York City resulted in the return of Col. Charles Clifton of the Pierce-Arrow Motor Car Company to the presidency for another year.

The board of directors will consist of three new and three old directors. The newly elected members are J. Walter Drake, Hupp Motor Car Company, Detroit; R. E. Olds, Reo Motor Car Company, Lansing, Mich.; Carl H. Pelton, Maxwell Motor Company, Detroit. The three re-elected were Alvan Macauley, Packard Motor Car Company, Detroit; William E. Metzger.

White (White), head of commercial vehicle division; second vice president, H. H. Rice (Waverly), head of electric vehicle division; secretary, R. D. Chapin (Hudson); treasurer, George Pope (Pope Manufacturing Company); general manager, Alfred Reeves.

The meeting decided that the jitney movement should be encouraged by makers, but that reasonable regulations of jitney service should not be opposed. A committee was appointed to draw up a report on the proper time to issue announcements of new models. Action was taken toward standardizing treads and methods of manufacture. It is generally understood that the



Windsor T. White of White Company, Second Vice President N. A. C. C.



Col. Charles Clifton of Pierce-Arrow Company, President N. A. C. C.



Alfred Reeves, Elected as General Manager of the N. A. C. C.

American Electric Car Company, Detroit, and C. W. Churchill, Winton Motor Car Company.

Seven new companies became members of the chamber: L. P. C. Motor Company, Racine, Wis.; Scripps-Booth Company, Detroit; Lexington-Howard Company, Connersville, Ind.; the Touraine Company, Philadelphia; Pratt Motor Company, Elkhart, Ind.; W. A. Paterson Company, Flint, Mich.; Sternberg Company, Milwaukee.

Officers chosen for the forthcoming year by the directors in addition to President Clifton, are: Vice president, Wilfred C. Leland (Cadillac); second vice president, Hugh Chalmers (Chalmers), head of the gasoline passenger car division; second vice president, Windsor T.

next meeting will be held at Detroit, although the by-laws require the annual meeting to be held at the general headquarters.

EXPORTS TO SOUTH AMERICA.

Exports of automobiles to South America for March showed a great increase in number, while they showed at the same time a decrease in value. This indicates that the business depression which has effected the southern continent has led people there to buy cheaper cars. Shipments for the month amounted to 205 cars, valued at \$92,599, as against 129 for the same month last year, valued at \$114,276.

INDUSTRIAL HAPPENINGS AND COMMENT.

THE Pyrene Manufacturing Company has supplied some of its dealers with large mechanical signs, on one portion of which is represented a disastrous fire, showing the home being consumed, the smoke pouring out of the windows, and the firemen hacking their way into the house. It is an exceedingly realistic portrayal and attracts great crowds wherever shown. The other portion of the sign shows a home in which the lady of the house is easily putting out a fire with the convenient, light and efficient Pyrene fire extinguisher. The company is receiving requests for the sign, and has already booked several hundreds of sets for some time ahead.

The Motor Sales, Inc., of Stamford, Conn., "The House of Minute-Man Sales Methods," has been selected to direct the wholesale distribution of the new Marlon Six in the New England states. The company announces that it will extend to the Marlon dealers and owners all the advantages of their unique and complete organization, the same as the dealers and owners of other cars are receiving.

King Motor Car Company, Detroit, Mich., has been noted for its originality of window displays. The latest

business, assets and patents of the Pumpelly Battery Company, Indianapolis, and incorporated into its own battery many features possessed by the more recent Pumpelly types. Harry Murphy, president of the Pumpelly company, becomes vice president of the Prest-O-Lite company and will have active charge of the battery department. The Pumpelly personnel has also been absorbed.

C. F. Ketterling, vice president and general manager of the Delco, recently delivered a speech, which has been preserved in booklet form by the Dayton Engineering Laboratories Company, Dayton, O. It is entitled "Who Knows What Next," and deals with some remarkable facts and figures met with in the sciences today, related in an easy conversational style and easily understood by the layman. It is printed on antique paper, in two colors, and is artistically laid out.

The Motor Car Equipment Company, New York City, has decided to add a new department to its plant, which will handle on a large scale bicycle, motorcycle and motor boat accessories and equipment and such marine hardware as is more or less standard for motor boat use.

For the benefit of accessory and equipment manufacturers, the address of the company is given as 55 Warren street.

The Harding Distributing Company, sole distributor of the Martell aligning reamer, made by the Harding Manufacturing Company, Mansfield, Mass., has taken permanent quarters at 40 Court street, Boston, Mass.

The Puritan Machine Company, Detroit, Mich., announces the appointment of T. E. Reynolds as manager of its accessory department. Mr. Reynolds has had considerable experience in this line through his former connection with the General Sales Company of Detroit.

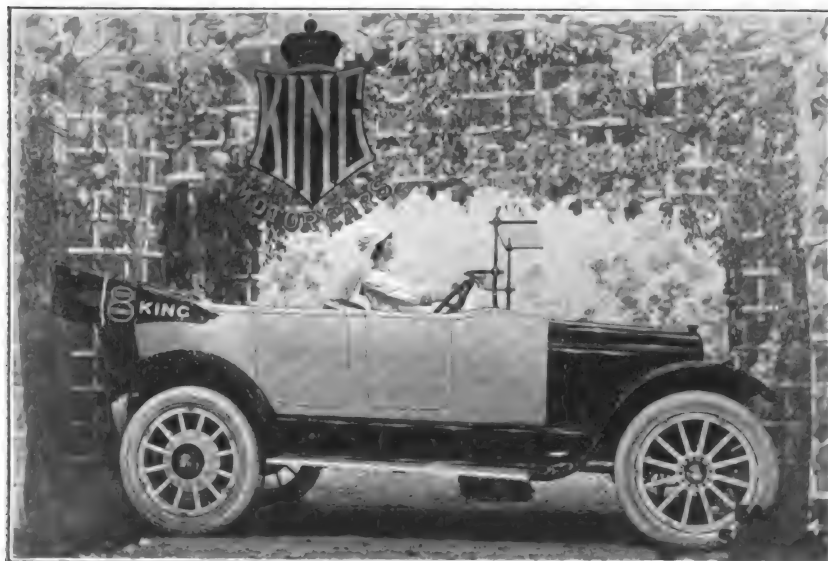
The Chalmers Motor Company, Detroit, Mich., is calling the attention of owners, through its dealers, to the conditions upon which the Gray & Davis electrical starting and lighting system used on the Chalmers cars can be exchanged. The company states that the manufacturer of the system will not exchange the generator if the seal has been broken. The seal on the first instruments sent out were located on the top centre of the cutout cover, while they now consist of a small lead and wire seal along the lower edge of the cover.

The Goodyear Tire and Rubber Company, Akron, O., has published a noteworthy contribution to trade literature.

It is in booklet form, entitled, "Goodyear Fortified Tires," and is issued to the trade upon request. It is primarily a discussion of big car requirements and is intended to illustrate the progress Goodyear has made in the big car field in the past few years. It is handsomely illustrated.

Chalmers Motor Company, Detroit, Mich., has laid plans for an extensive addition to its building No. 5, of a four-story, 90 by 60-foot wing of concrete and steel. That section of the plant is devoted to the manufacture of motors and other parts. Record breaking sales for April and May have made it necessary to increase the facilities of those departments.

The Joseph Dixon Crucible Company, Jersey City, N. J., manufacturer of Dixon lubricants, is distributing a "fire" red wall hanger, which states "This Is Dixon Week—Come in and Learn How to Lubricate Your Car." It has a centre panel and portraits of some of the racing drivers who use Dixon graphite lubricants and heartily endorse them. The Dixon company has also published an interesting booklet in colors which contains a very complete portrait gallery of the leading racing drivers. It is a valuable collection.



Window Display in the King Motor Car Company's Factory Salesroom at Detroit.

shows an eight-cylinder King car in action, by having the wheels jacked up and run by the power of a small motor. The wax figure of a woman seated at the wheel is draped in all the latest of what is proper for motoring apparel, and the surroundings typify a pleasant motoring scene. King dealers throughout the country are being requested to make similar displays in their show rooms.

John F. Lanier, in charge of the sale of Diamond tires in the southwest, with headquarters at St. Louis, has severed his connection with the B. F. Goodrich company to accept a responsible position with the Norwalk Tire and Rubber Company, Norwalk, Conn. In his new connection he will have entire charge of the sale of Norwalk tires for the central part of the country. He has had wide experience in the tire industry, having been in charge of sales in Buffalo, Kansas City, St. Louis and New Jersey.

The Prest-O-Lite Company, Indianapolis, Ind., has entered the electric lighting field, and is now manufacturing the Prest-O-Lite storage battery. The company is said to be preparing to place behind the battery a system of services of unusual character and scope. The company recently purchased and absorbed the entire

NEW OVERLAND ROADSTER "FOUR" AT \$725.

Largest "Four" to Be Produced by the Company Is Practically a Continuation of \$1075 Car of 1915, Improved and Refined.

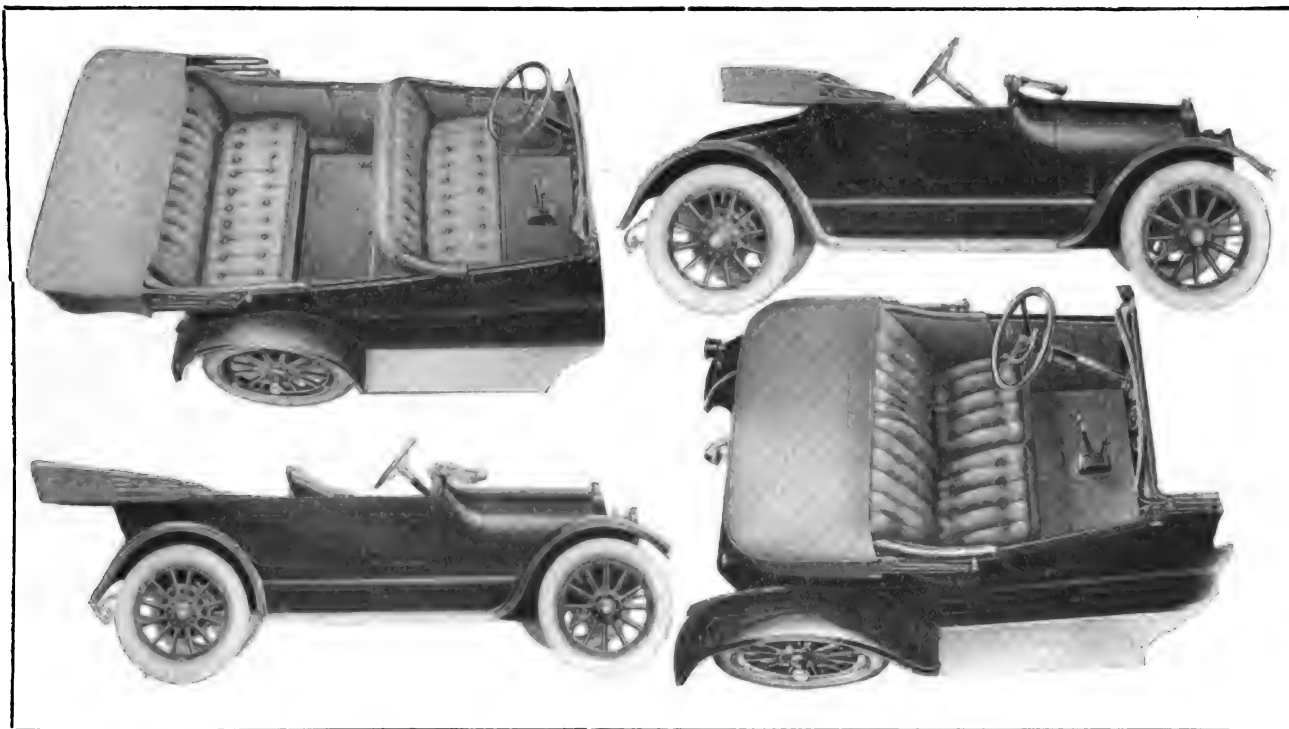
EQUALLY surprising to the motoring world and to the industry was the announcement by the Willys-Overland company that its model 83, four-cylinder car for 1916 (which will be practically a continuation of the 1915 model 80, selling at \$1075, with some important improvements and refinements), is to sell for \$750 as a touring car and \$725 as a roadster.

This is substantially a reduction of \$325 in price, and model 83 is to be not only equal in size to model 80, but the design has been im-

proved to the plant that are being completed will make this great production possible.

The model 83 car follows the lines of previous Overland practise and is so similar externally to the \$1075 car of 1915 that they cannot be differentiated. It is equipped with a large five-passenger touring body of handsome streamline design.

The motor is identical with that employed in the larger of the Overland "fours" of 1915. As the weight of the car has been reduced by the



Overland Model 83 for 1916, Showing the Five-Passenger Touring and the Two-Passenger Roadster, and the Splendid Lines and Ample Seating Arrangements of Both Types.

proved and brought up to a very high standard. Model 83 will be the largest car of the four-cylinder type that will be produced by this company and it will supercede both models 81 and 80, sold previously at \$850 and \$1075 respectively.

The reason given for the decreased price is the great increase in production at the Overland factory that is planned for the coming year. An output of 75,000 cars, or an average of about 600 a day, is determined as against 400 cars a day maximum capacity this year. Large extensions

use of stronger materials, the car is proportionately even more generously powered.

The four L head cylinders are cast singly with valves on the left side. They are bolted to the two-part aluminum crank case. The cylinders are offset 9/16 inch, which reduces the angularity of the connecting rods on the power strokes. The exhaust and intake manifolds are of large dimensions, the former located above the intake.

Unusual rigidity is obtained for the carbon

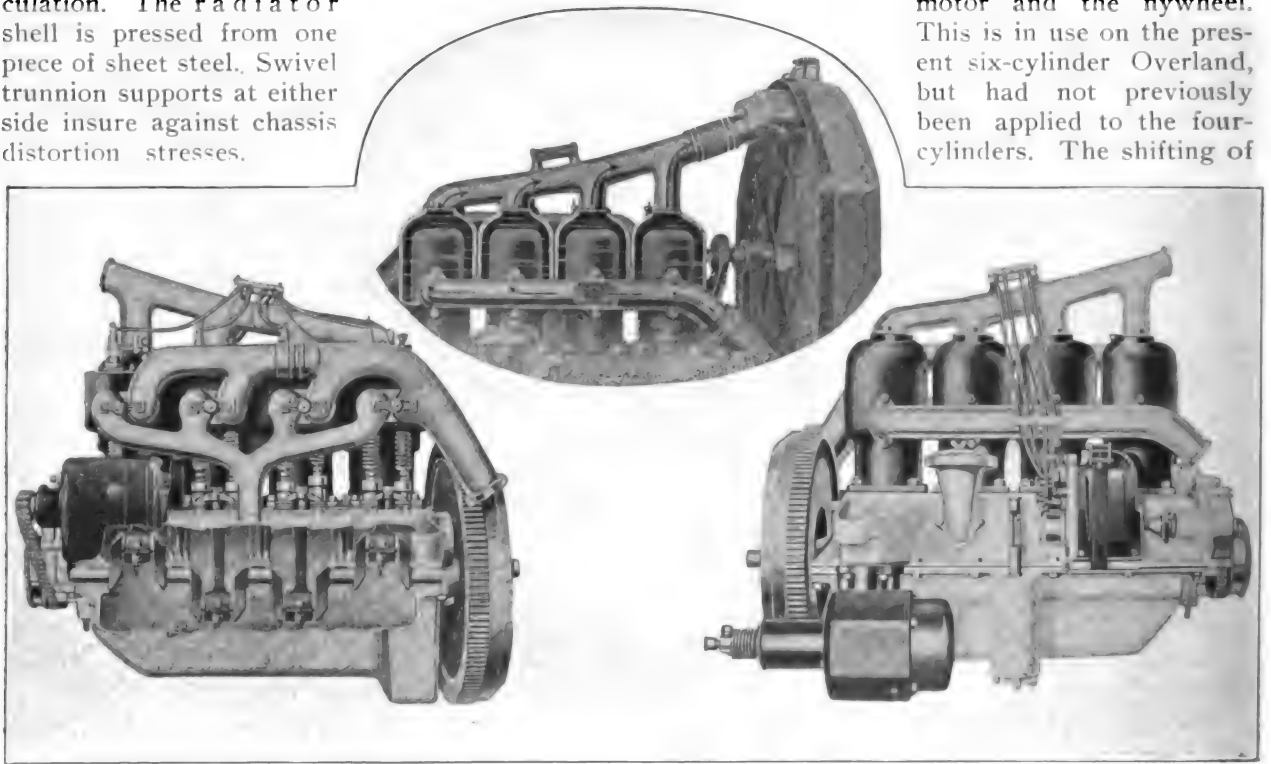
steel crankshaft by the use of five main bearings of liberal size. Integral cams on the three-bearing camshaft act directly upon the tappets. The pistons are fitted with two rings above the wrist-pin and have oil grooves to keep the lubricant out of the combustion chamber. Hollow wrist-pins are attached to the piston bosses by set screws, the rod ends oscillating on bronze bushings. The connecting rods are I beam drop forgings. The cylinder bore is $4\frac{1}{8}$ inches and the stroke $4\frac{1}{2}$ inches.

The motor is cooled by a thermo-syphon system. The large fan runs on ball bearings, and the radiator is a cellular type with vertical circulation. The radiator shell is pressed from one piece of sheet steel. Swivel trunnion supports at either side insure against chassis distortion stresses.

ing and which can be easily seen even though the glass is not clear.

The Auto-Light cranking and lighting system starter unit is placed on the right rear side of the crankcase, and the generator on the opposite side at the front. The generator is driven by silent chain from the crankshaft. Ignition by a high-tension magneto is entirely separate from the starting and lighting system. No dry cell battery is necessary. The magneto is driven by gear and shaft and is carried on the right forward end of the crankcase.

An important improvement is the use of the Bendix driving connection between the starting motor and the flywheel. This is in use on the present six-cylinder Overland, but had not previously been applied to the four-cylinders. The shifting of



Power Plant of the Overland Model 83, Showing the Right and Left Sides of the Motor, and in the Oval Insert a Phantom View of the Thermo-Syphon Cooling System with Its Large Water Pipes and Jackets.

Constant level splash lubrication is used, the oil being forced through a sight feed gauge on the dash by a gear pump. From the gauge it flows by gravity to the connecting rod troughs, where it is splashed to the bearing surfaces by small scoops on the ends of the rods. The pump is placed inside the crankcase instead of outside as heretofore. The pump design is unchanged, but the inclosure in the crankcase prevents loss of oil that may leak at the pump. The pump includes a strainer, so that the lubricant is constantly purified. The sight feed is fitted with a small vane, which revolves when the oil is mov-

ing and which can be easily seen even though the glass is not clear.

The starter gear is entirely automatic after the current has been sent to the starting motor. A weighted pinion is mounted on a threaded shaft, so that the weight carries the pinion into engagement when the shaft begins to revolve.

This pinion automatically screws forward on its shaft until it reaches the end position, when the pinion gears come into engagement with the teeth on the flywheel rim. A coil spring is provided to prevent the pinion from taking hold of the flywheel with too great a shock.

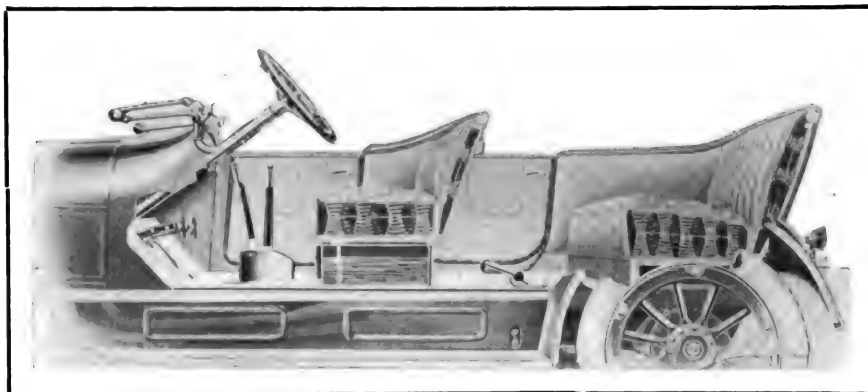
As soon as the engine begins to revolve under its own power it goes faster than the starting

motor and the threaded shaft on which the driving pinion is mounted. This serves to back the pinion on the threaded shaft and throws it out of engagement. It is therefore impossible to harm the device by switching on the starter current when the motor is in operation, for it would automatically be thrown out of engagement at once.

The clutch is the usual leather-faced cone of Overland practise with a clutch brake to facilitate gear changing. The clutch pedals are adjustable to suit the operator. Spring pressed studs under the clutch facing assure easy, gradual engagement. The transmission gearset is a selective sliding type and is located on the rear axle as a unit with the differential. There are three speed forward ratios and reverse. The gears are double heat treated nickel steel with stub teeth. Annular ball bearings are used.

The steering wheel is on the left side and actuates a full gear and worm of hardened steel, which is adjustable to take up wear. The steering column is anchored at the top to prevent vibration. The centre control levers are similar to last year. Electric

switches are located on the steering column. Their arrangement has been improved over last year. They are contained in a box which has two

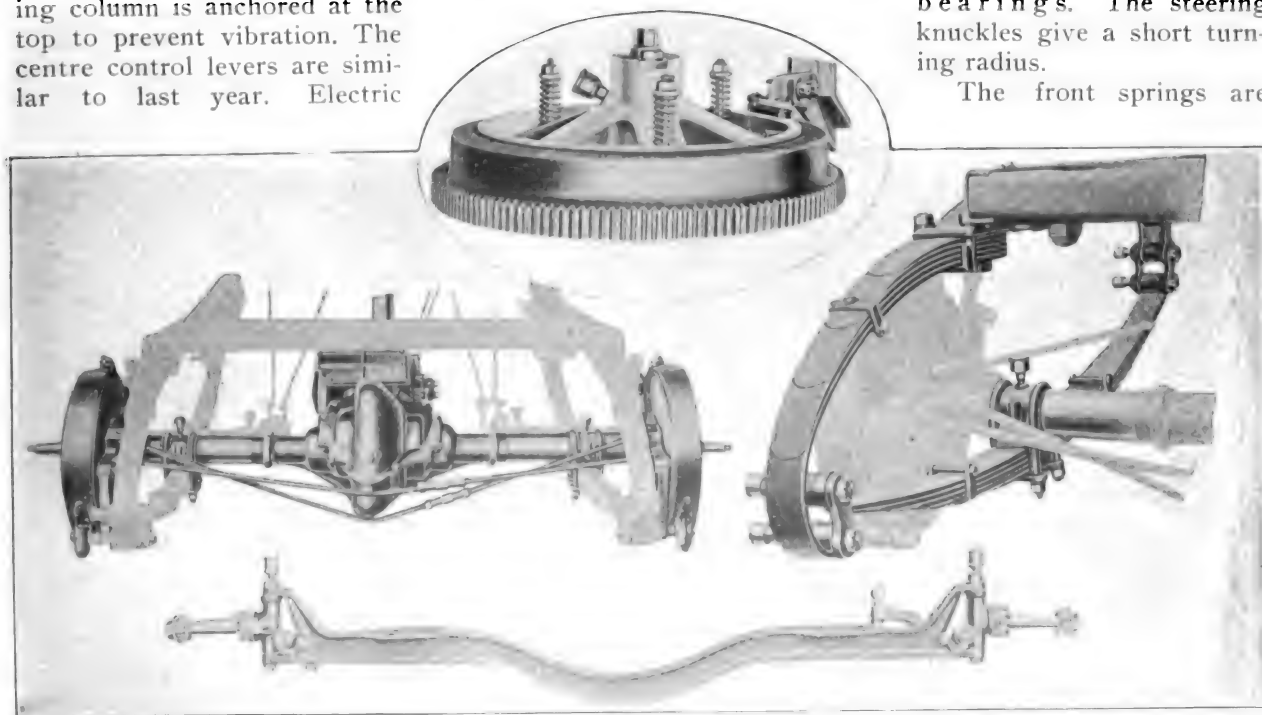


Cut Out View of the Upholstery of an Overland Model 83; Four Rows of Coil Springs in Each Cushion and Three Rows in the Tonneau Back.

key slots—the upper one for operating the light switches and the lower one the ignition. Removal of the key automatically locks the switches. The horn button is at the top of the box.

The rear axle is a floating type, with four bevel differential gears, removable shafts and flexible roller bearings. The front axle is an I beam section drop forged in one heating without welding. It is fitted with adjustable taper roller bearings. The steering knuckles give a short turning radius.

The front springs are



Group View, Including Rear Axle and Transmission Gearset Unit, One-Piece Drop Forged Front Axle and Adjustable Taper Bearings on Which Front Wheels Run, Underslung Spring Suspension and Compression Grease Cup, and in the Insert the Leather-Faced Cone Clutch and Clutch Brake with Six Spring Pressed Studs.

semi-elliptic, 36 length and $1\frac{3}{4}$ inches width, and the rear springs are three-quarter elliptic rear, length 47 and $1\frac{3}{4}$ inches width. The rear springs

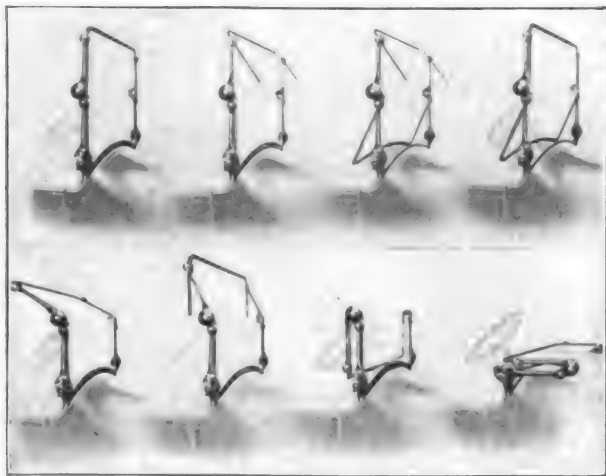


Illustration of the Eight Different Positions to Which the Windshield May Be Adjusted.

are slung under the axle in swivel seats.

The wheels are artillery type with 12 hickory spokes, fitted with 33 by four-inch quick detachable non-skid tires in the rear and smooth tread tires in front. All wheels are fitted with demountable rims.

The bodies are a streamline type with one piece cowl. The seats are roomy, with exceptionally high backs and with cushions built on deep coiled springs.

One of the striking new features of the car is the leather-bound cloth upholstery, which takes the place of the leather formerly used. This was adopted in place of either leather or imitation leather because of the difficulty of securing sufficient good leather for upholstery on such a large output and the fact that imitations have not been found to be satisfactory.

A waterproof cloth that is durable and easily cleaned has recently been perfected and after test proved to be fully as desirable for upholstering purposes as leather. The cloth is comfortable because it is not slippery and clings to the clothing of the passenger. It is not dressed with oil, so that in hot weather the dressing will not be drawn out by the heat and spot the clothing.

The cloth is worsted fabric with a waterproof treatment on the underside. Dust can be readily removed with an ordinary brush and grease spots can be eradicated by a thorough washing with soap and water.

The front doors are hinged at the forward side, are exceptionally wide and are a U type, with disappearing hinges. There are large pockets in all doors. The back of the front seat is covered below the robe rail and the tool compartment is under the rear seat.

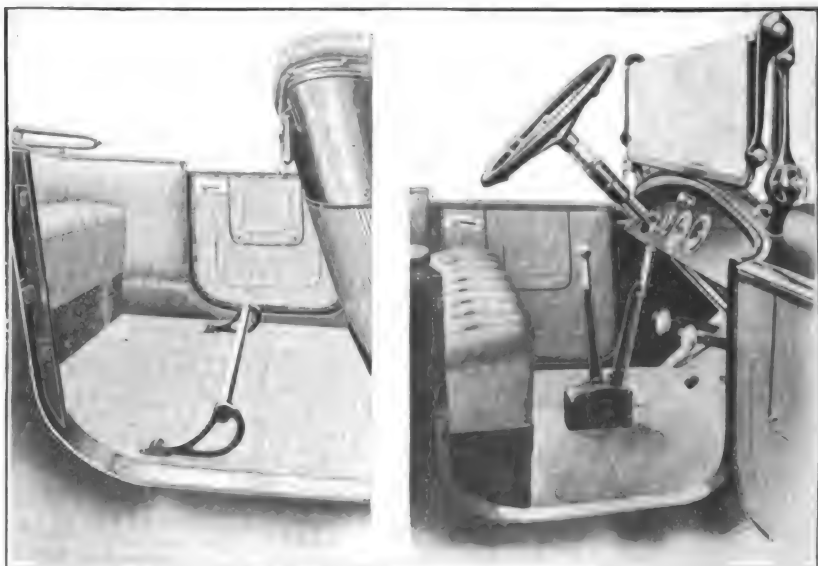
The fenders are crowned and of heavy sheet steel. The finish is Brewster green with ivory striping. Fittings are nickel plated metal and polished aluminum. The fenders and trimmings are black enameled.

The equipment includes the Auto-Lite six-volt, two-unit starting and lighting system, with head and tail lamps. The necessity for dash lamps has been obviated by the use of dimmers for the headlights.

A new built-in rain vision type of windshield, with ventilating features, which can be adjusted to many different positions to suit the driver, is supplied.

The speedometer is a magnetic type. There is an electric horn, a muffler cut-out, license tag bracket integral with tail light bracket, tire carriers in rear, extra demountable rim, hinged robe rail, foot rest, full set of tools, tire repair kit, jack and pump.

The front fastening of the oneman top is new. Instead of attaching to the rigid supports of the windshield, metal braces are supplied,



Upholstering and Finish of Interior and the Location of the Control Members—All Indicating Instruments Are Set at an Angle in the Cowl Dash Instrument Board for Convenience.

which lie flat when the top is folded, but which hold it rigidly forward when it is open. These attach to the top at about the point where the windshield supports would ordinarily come and are clamped at the other end in sockets at the end of the windshield. This does away with immovable side pieces.

PITTSBURG PARKING LOTS.

Enclosed parking spaces on ground owned by the city of Pittsburg have been thrown open to the use of the automobile owners in that city. These parking spaces are similar to those that have been operated in New York City since traffic regulations forbade the parking of cars on the streets, and there are similar ones in Cleveland and many other cities.

In Pittsburg the city not only furnishes the ground on which the cars are parked, but it supplies a policeman to watch them during the day time. No fee is charged for the service.

One of the lots is on a plat of land opposite the Allegheny county court house, upon which a new city hall will shortly be erected. Another and smaller lot is on Grant street.

This system was inaugurated after the police had pressed a vigorous campaign against owners who permitted their cars to stand for more than 30 minutes on the downtown streets. It was found that the downtown garages could not accommodate the number of cars that had to be stored every day. The larger lot will soon have to be closed to begin excavation for the new building and then some other arrangement will have to be made.

MARMON TEST IN NEW YORK TRAFFIC.

Repeating the test made recently in Chicago, a Marmon 41 was given a high gear test in the heavy traffic on Broadway, New York City, making 75 stops from which starts were made on high gear in travelling the length of the street. The gasoline consumption was 12.8 miles per gallon. In a similar test in the heavy traffic of

Chicago's Loop district it was only 7.75 miles per gallon.

The difference in fuel consumption is thought to be the result of the faster movement of traffic in New York City and the shorter waits required at corners by the traffic squad. On the Ocean Parkway, the same car, with gears sealed in high, made a non-stop test showing 16.9 miles per hour. The test was made under the observation of the American Automobile Association.

MANY ACCIDENTS ELIMINATED.

Safety first methods, introduced into the plant of the Federal Rubber Manufacturing Company of Milwaukee, have reduced the number of accidents to employees by nearly 75 per cent.

Warnings and instructions regarding methods



City Owned Out Door Garage for Car Owners of Pittsburg—Plot Worth \$2,000,000.

of avoiding accidents are posted in all parts of the plant. Photographs are shown to illustrate how accidents of certain kinds occur. Machinery is fitted with guards to prevent injury.

In each department a safety first committee was organized among the men to report to the officials of the company any condition with regard to machinery or the condition of the building that might lead to accidents. All employees were encouraged to report similar conditions, or any habit on the part of other employees that might result in danger. In addition to these committees an inspector goes through the entire plant every week on safety first work. The propaganda has not only reduced ratio of accidents, but has speeded up production.

SAXON CARS SHOW GREAT ECONOMY.

TWO Saxon cars recently completed long endurance tests wherein they showed remarkable staying powers. One of these, driven by G.

An interesting feature of the Boston-Springfield run was the whirlwind finish. The driver sent his car from Boston to Springfield without once stopping his motor, and after delivering a letter to the mayor of Springfield—his motor still continued to run—he resumed his trip and added 300 more miles to his non-stop record.



Mud Covered Saxon Roadster As It Appeared at the End of 4500-Mile Endurance Test in Michigan.

F. Lombard, registered over 6000 miles in 30 days and averaged better than 31 miles to the gallon of gasoline and 75 miles to a pint of oil. The other covered 4500 miles over some of Michigan's worst roads, in the hands of J. Eckert, within 30 days and averaged about 37 miles per gallon of gasoline.

Mr. Lombard drove his roadster between Boston and Springfield, covering 200 miles a day for a month, and on one of these days he completed a trip on six gallons of gasoline and 2½ quarts of oil. The fastest time made between the two cities was five hours and 45 minutes. His car, as was the one that operated in Michigan, was a regular stock model and carried the standard equipment.

The Michigan test was run from Detroit on two different routes, each averaging 150 miles. That the driver had to contend with some poor roads and unpleasant weather is testified to in the accompanying photograph. He not only met with rain storms, which occurred about half the time he was on the road, but had to drive through roads of deep mud, sand and clay and over steep hills.

\$27.64, which places the cost per mile at about one-half cent. The best day's economy average was 33 miles per gallon of gasoline and 100 miles to the pint of oil.

Patents have been issued in Germany for the making of a lubricant from beet sugar molasses. This process is still in the experimental stage and the exact qualities of the lubricant are not yet known. The ordinary production of molasses in Germany before the war was 450,000 tons a year, and this amount could be increased without limit.



The Saxon Roadster Which Ran 6000 Miles Between Springfield and Boston in 30 Days.

SUGGESTIONS FOR THE FORD CAR OWNERS.

The Details of Construction of the Reciprocating Parts of the Motor and the Mechanism for Operating the Valves—The Effect of Variables.

The 25th article dealing with the construction, operation, maintenance, care and repair of the model T Ford chassis is devoted to the consideration of the valve mechanism and relations of the different components to efficient engine operation.

SIMPLICITY has been sought in the design of the motor of the Ford model T chassis, but efficiency has not been sacrificed and these engines are very enduring with consistent care and attention. What has been stated with relation to the general detail of the construction of the cylinder block, the crank case and the transmission gearset case has had more or less reference to the other components, but these have not been described.

The cast section of the motor crank case has a central transverse web, and the front and rear ends of the crank case, with the web, carry the three main bearings on which the crankshaft is mounted. The crankshaft is conventional in construction, it being made of vanadium steel, drop forged and machined and ground. The flange to which the flywheel is bolted is formed integral with the shaft. The shaft is heat treated to insure strength and endurance, and it is mounted in three babbitt lined journals that are carried in the web and the ends of the crank case. The

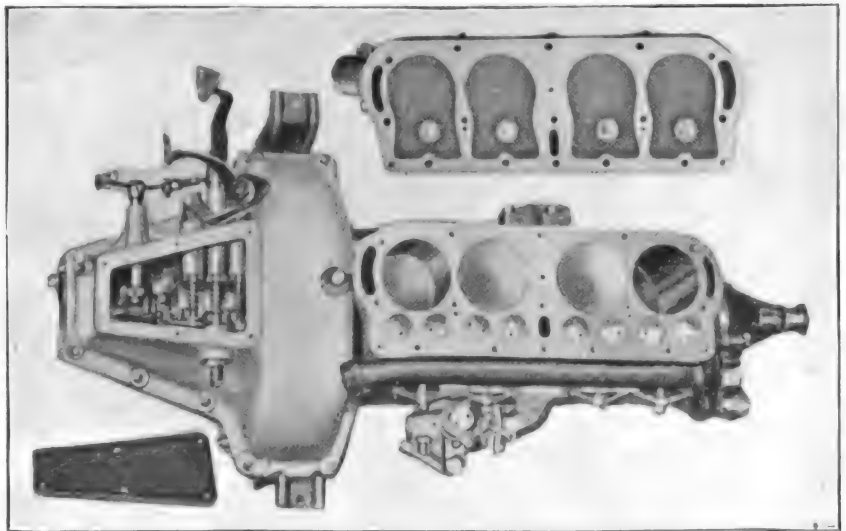
camshaft is a single-piece vanadium steel drop forging with the cams formed integral, and this is carried on three bearings.

The simplification of the motor has led to the use of but one camshaft, and this is at the right side of the motor. It is of generous proportions and it is driven by a gear operated by a pinion mounted on the crankshaft forward of the front main bearings. The statements relative to the opening and closing of the valves have informed the reader that the intake valve is opened after the piston has dropped 1/16-inch in the suction stroke and that it is closed when the piston has

moved upward 9/16-inch in the compression stroke, or slightly more than a half revolution of the crankshaft, and the exhaust valve is opened when the piston is within 5/16-inch of the end of the expansion stroke, and closes when the exhaust stroke has been completed, or slightly more than a half revolution of the crankshaft. During all the compression stroke and nearly all of the expansion stroke, both valves are closed.

Camshaft Turns at Half Speed.

To cause the valves to lift and close at the precise times the camshaft is turned but half as many times as the crankshaft, and for this reason



Top View of the Ford Model T Motor with the Cylinder Block Head and the Cover of the Transmission Gearset and Clutch Housing Removed.

the gear of the camshaft is proportioned to turn once for each two revolutions of the crankshaft. The cams are formed integral with the camshaft and in such relation to each other that the valves are lifted and lowered at the times that have been stated. As the cams cannot be changed on the camshaft when the pinion of the crankshaft and the gear of the camshaft have been once correctly meshed, there can be no change in the timing, although wear of the cams, pushrods or tappets, the valve stems and the valve ports or seats may eventually have some influence that may require adjustment.

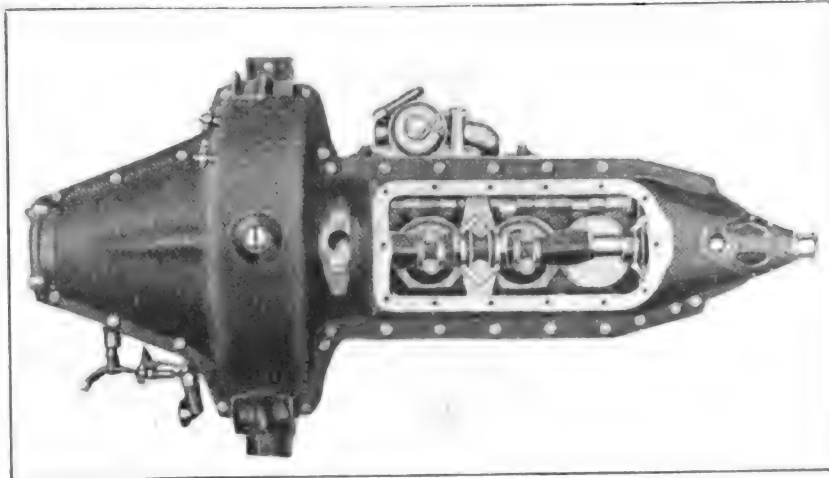
The pistons of the Ford engine are cast of the same material as the cylinder block, a gray iron, and these are turned and ground to size, and are channelled for three piston rings, two of those being above the wristpin and one below. These piston or packing rings are of cast iron, shaped to accurately fit the channels, eccentric in form and split diagonally so they may be spread sufficiently to be pushed over the pistons. Usually much care is taken in making the piston rings to insure sufficient elasticity and to have accurate fit. The purpose of piston rings in a cylinder is to prevent the heated gas being forced by the piston in the cylinder during the expansion stroke or the exhaust stroke, and to insure against leakage in a similar manner during the suction and compression strokes.

When the cylinder is bored it is made slightly

they are not above or below each other, and the very slight volume of gas that might pass through these openings under high pressure is not sufficient to materially affect the practical operation of the motor. The packing rings are slightly larger than the piston and the cylinder when not compressed, and when the piston is placed in the cylinder there ought to be theoretically, at least, equal contact and pressure on the cylinder walls. But the piston may not actually be in contact with the cylinder walls.

Oil Prevents Leakage of Gas.

Normally, when a piston is placed in a cylinder without lubricant, there will be no leakage if the packing rings are well fitted, but when lubricated the oil still further seals the clearance space, and only when subjected to constant heavy pressure would there be any diminution of the volume of gas. The minimum contact area of the rings minimizes the friction of the piston movement on the cylinder walls, and the distribution of the lubricant is assured by the oil that is gradually accumulated between the rings. In practical operation the movement of the piston rings on the walls of the cylinders polishes the metal, and this minimizes friction and makes for closer contact and better sealing of the clearance by the lubricant. There is, of course, more rapid wear of the rings than of the cylinder walls, and in the event of long use the rings can be re-



View of the Ford Model T Motor with the Cylinder Block Head, the Bottom Plate of the Crankcase and the Forward Piston Removed—The Engine Being on Its Side the Empty Cylinder Is to Be Noted.

larger than the piston for several reasons. Were the piston an exact fit there would be excessive friction that would cause loss of power, as well as resulting in extreme heat, and as the cylinder is cooled and the piston is subjected to the full explosion temperature during the expansion stroke, the piston and cylinder do not expand equally. The piston of a combustion engine is usually slightly smaller at the head to allow for expansion, and the clearance is compensated by the packing rings, which can expand or contract in the channels, completely filling the space between the piston and the cylinder.

The walls of the piston are made sufficiently thick so that they can be channelled to the required depth. The packing rings are cut diagonally in the Ford motor and these openings are placed when the motor is assembled, so that

placed at comparatively small cost and the compression restored without expense other than for labor. With adequate lubrication, however, there is no reason to regard the matter of wear as of serious importance.

The piston is cast with two internal bosses, the centres of which are slightly above the centre of the walls, and these are bored and fitted with bronze bushings or bearings for the gudgeon pin or wristpin. The connecting rods are vanadium steel drop forgings, an I section type, which are formed with small ends to be drilled and split so that they may be clamped on the wrist pins. The wrist pins are steel tube, hardened and ground, which are clamped and keyed by the clamping bolts, the ends of the tube oscillating in the bronze bushings of the bosses.

The big ends of the rods are divided, the caps

being secured by two heavy bolts and nuts. Into *these* big ends are fitted the babbitt bearings, the metal being poured into the recessed rods and caps, the recesses being so formed that the babbitt is firmly held. When the bearings are fitted the molten metal is placed in the recesses and when contracted by cooling the bearings are fixed. They are scraped to size and to conform to the crankshaft by hand, and after the engine has been driven for a comparatively short time the bearings will be so formed that they will have glass-like surfaces. They are then at their highest degree of efficiency.

The journals which carry the babbitted main bearings are cast in the webs in the crank case and the bearings are cast to generally conform to them. The bearings are fitted in practically the same manner as are those for the connecting rods, but shims are generally used. Shims are pieces of thin brass or other metal that are placed between the journals or caps to obtain a precise fit, for the babbitt metal must carry the load and yet there must not be sufficient pressure upon it to cause wear. The shims fill the space between the caps and insure rigidity, for were the bearings loose the crankshaft would not be firmly held and a "knock" would be developed that would eventually be very destructive of the bearings of the crankshaft, connecting rods and wrist pins. As the bearings wear the shims can be reduced in number to adjust the surfaces, and precise relation can always be maintained.

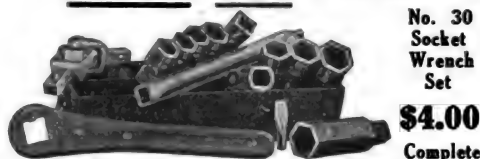
Camshaft and Valve Mechanism.

The camshaft is a vanadium steel drop forging with the cams integral that is liberal in proportion. This is carefully machined and ground and it is mounted in three bearings. The front and centre bearings are cast iron and are mounted in the webs of the cast iron portion of the crank case, but the rear bearing is a bronze bushing fitted into the web. The forward and centre bearings are removable so that when these are loosened the camshaft can be drawn out of the rear bearing and taken from the crank case.

The valve mechanism consists of a series of eight valves, on the right side of the motor, four of these for admitting fresh fuel to each cylinder and four for exhausting the cylinders. The valve ports are in the cylinder block, with the edges cut at an angle of 45 degrees, the inclination being from the top to the bottom of the ports. The two end and the two centre ports exhaust the cylinders and the other ports admit the fuel. The valves are circular and the heads are formed with edges that coincide with the edges of the ports,

Mossberg Guaranteed SMALL CAR TOOLS

O
S
B
E
R
G
•
G
U
A
R
A
N
T
E
E
D
•
T
O
O
L
S



No. 30
Socket
Wrench
Set
\$4.00
Complete



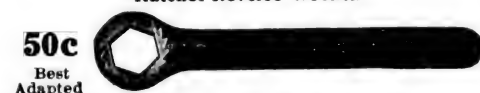
An ideal
set for
light car
users
\$2.00

Small Car Socket Wrench Set No. 17
Ford Reverse and Brake
Pedal Wrenches



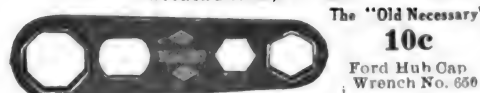
12c
Single End

S. E. Reverse Brake and Cylinder Head Wrench No. 640
Ratchet Reverse Wrench



50c
Best
Adapted

Ratchet Reverse Brake Pedal and Tension Spring
Wrench No. 645, No. 7454.



The "Old Necessary"
10c
Ford Hub Cap
Wrench No. 650

Kit Wrench for FORD and Metz



16c

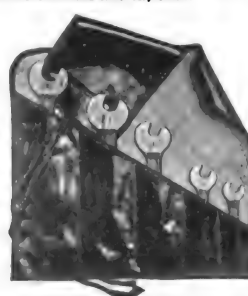
Triple End Cylinder Head and Housing
Wrench No. 630

Almost indispensable on cylinder head and Axle
Housing Nuts because the sockets are tapered **26c**



Valve Grinder
for Ford

The Logical Valve
Grinder



FORD
Engineer's Set **\$1.00**

FRANK MOSSBERG CO.
ATTLEBORO, MASS.

If your dealer cannot supply you, we will ship prepaid on receipt of price. Send for Catalogue No. 171 E.

(When Writing to Advertisers Please Mention The Automobile Journal.)

and these are ground so there is exact fit, and when the valves are closed there will be no leakage of gas. The valve stems extend downward through the chambers beneath the valve seats, which communicate with the intake or exhaust manifolds, and passing through long guides in the cylinder casting project below the guides. In the valve stems are cut vertical slots for keys, and the valves are normally kept closed by helical springs that surround the stems and are seated against the valve guides and against collars on the valve stems, the springs being compressed when the collars and keys are in place. This spring compression or tension is predetermined and is sufficient to keep the valves seated, so that there shall be no leak.

The Push Rods or Tappets.

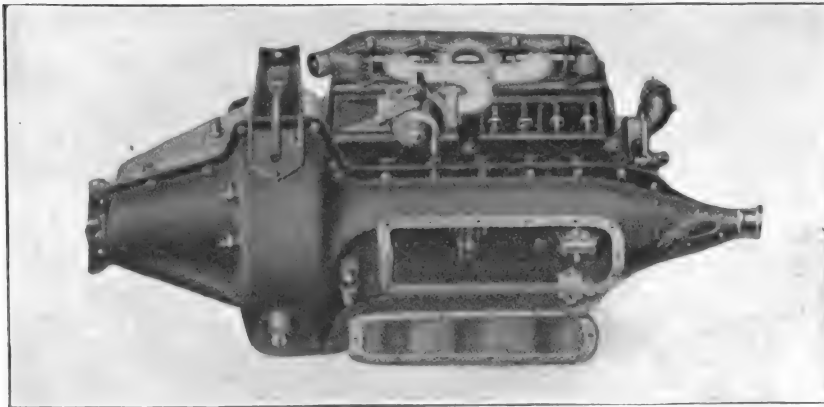
The valves being closed by pressure of the springs, they are lifted or raised at the intervals

it is seated, and then the rod will drop below it and will contact against the cam by gravity so long as there is clearance between the rod and the valve.

The valve stems and the tappets are hardened and ground to minimize wear, and are of liberal size. The tappet heads are enlarged to have large wearing surfaces where they contact with the cams, and with adequate lubrication they are very enduring. The valve stems and tappets are enclosed by cover plates that are attached by studs, which thoroughly protect them against dust and abrasives of all kinds. Normally there is but one condition to be expected from continuous operation, this being the wear of the upper ends of the tappets and the lower ends of the valve stems, which will eventually result in the increase of the clearance between the ends when the valves are seated, and this will gradually decrease the height of the lift of the valves and will lessen the efficiency of the valve action.

Precise Relation of the Valves.

The statement has been made that the valves operate at exact intervals, that each function requires precisely the same period, and the operation of these is dependent upon the camshaft. The location of the cams on the shaft with reference to each other and the form of the cams are two factors of importance. The cams are 90 degrees apart from toe



The Model T Ford Motor on Its Side and the Bottom Plate of the Crankcase Removed for Work on the Connecting Rod Bearings.

and for the periods necessary by push rods or tappets. These push rods operate in guides cast in the cylinder block and are formed with a wide, flat head at the base. The tappets are placed in the guides before the camshaft is installed, and with the push rods in place the heads rest on the faces of the cams of the camshaft. One portion of the circumference of the cam face is pointed. As the camshaft is revolved the tappets are always in contact with the cams, gravity keeping the heads at the lowest point. As the pointed face of the cam is turned against the wide head of the push rod the rod is forced upward, and as there is normally a clearance of from $1/64$ to $1/32$ -inch between the tappet and the lower end of the valve stem, the tappet will strike and lift the valve to the full height or the length of the cam, compressing the spring as the valve is lifted. As the cam continues to turn the compression of the spring will force the valve downward until

to toe, and the shape of the cams are such as will afford the most satisfactory opening. There is necessity of lifting the valves quickly to have the most efficient operation, that is, to obtain the widest space between the valves and the seats in the shortest time that is possible that there be little or no obstruction to the passage of fuel gas into the cylinders or the exhaust gases from them. A definite interval must elapse from the beginning of the lifting of the valve to when it reaches maximum height, and the valve must be kept fully open as long as is practicable and closed as quickly as is possible. Obviously, with the cam movement, there must be variation of the valve clearance above the seat, and to obtain efficiency the valve must remain open for such period as will insure complete filling of the cylinder with gas, or its full exhaustion.

(To Be Continued.)

FORD CAR ACCESSORIES AND EQUIPMENT.

J-B FORD MASTER VIBRATOR.

Special Type Instrument of High Efficiency Now Produced by the J & B Manufacturing Company.

Very broad claims for efficiency are made for the new high-grade master vibrator, especially designed for use on Ford cars, by its maker, the J & B Manufacturing Company, Pittsfield, Mass. The price is exceedingly moderate for the value given. It is a box type assembled in a heavy mahogany case, with enclosed switch, that is maintained to be fully protected from water and dust and is constructed to be fool proof and will not become disordered.



New J-B Master Vibrator for Ford Chassis.

The electrical element of the instrument is said to differ from that of any other make. It is designed to be operated from the alternating current generated by the Ford magneto. The vibrating points are a special J-B type and are enduring. The vibrator will, the company states, supply a uniform current at the spark plugs and obviate all the effects that may be expected with ignition systems. With this there is no necessity for using individual vibrators, so that there ought to be extreme satisfaction from its use. This instrument is guaranteed as long as it is used and is sold at \$8. Interested owners can obtain further information from the company by mentioning this publication when writing.

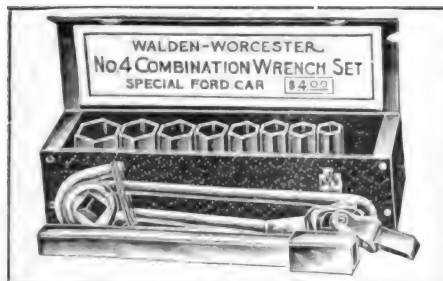
The electrical element of the instrument is said to differ from that of any other make. It is designed to be operated from the alternating current generated by the Ford magneto. The vibrating points are a special J-B type and are enduring. The vibrator will, the company states, supply a uniform current at the spark plugs and obviate all the effects that may be expected with ignition systems. With this there is no necessity for using individual vibrators, so that there ought to be extreme satisfaction from its use. This instrument is guaranteed as long as it is used and is sold at \$8. Interested owners can obtain further information from the company by mentioning this publication when writing.

company states, supply a uniform current at the spark plugs and obviate all the effects that may be expected with ignition systems. With this there is no necessity for using individual vibrators, so that there ought to be extreme satisfaction from its use. This instrument is guaranteed as long as it is used and is sold at \$8. Interested owners can obtain further information from the company by mentioning this publication when writing.

WALDEN COMBINATION WRENCH SET.

Socket Wrenches Designed to Reach Inaccessible Nuts Prove of Great Utility for Ford Cars.

The Walden Manufacturing Company, 60 Commercial street, Worcester, Mass., makes socket wrench sets designed to meet the requirements of the Ford car. These sets should be handy acquisitions to any car owner, as they can be applied to inaccessible nuts and bolts that cannot be reached with the ordinary wrench. Each tool is complete in every detail. A set includes ratchet wrench, extension bar, universal joint



Walden No. 4 Combination Wrench Set.

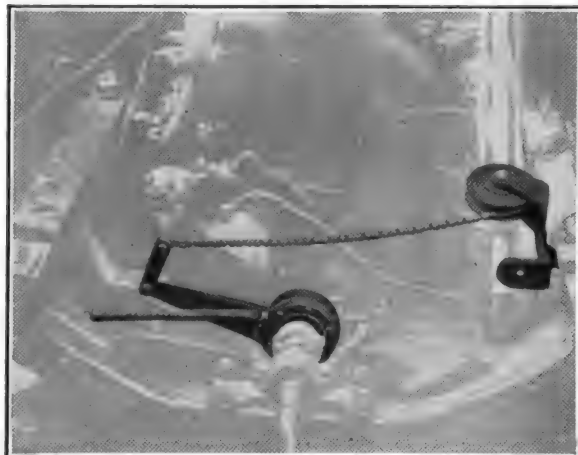
and eight sockets. Each piece is made of steel and cannot break or split. One of the advantages of a socket

wrench is that the socket fits over the nut and bolt, thereby equalizing pressure on all sides. The common wrench usually places all the pressure on only two sides. When the nut or bolt has been in position for a length of time, it is frequently impossible to move it with the ordinary wrench; if a socket wrench is not at hand, the member usually has to be driven with a cold chisel, which damages the appearance and usefulness of the bolt. The illustrated set of wrenches is listed as the Walden No. 4 and retails for \$4. It is shipped neatly packed in a serviceable fibre box. The company guarantees that all the wrenches will give good service.

A NEW FORD STARTER.

A Manually Operated Starter for Ford Cars, Which Also Prevents Injury from Back Fire When Using Crank.

The American Dadco Company, 316 K Moffat building, Detroit, Mich., is manufacturing a mechanical starter



American Dadco Company's Mechanical Starter Assembled on a Ford Car.

for Ford cars whose simplicity of installation and the strength of the working parts commend its use to anyone who values convenience. No electric current is needed in its operation, as the power is manually applied by pulling a lever conveniently located near the driving seat.

The working principle of the device, as seen in the illustration, is as follows: When the lever is drawn up the outer rim of the starter instantly compels a hardened steel ball to follow to the top of a small groove on the inside, where it protrudes and engages the pulley, thereby effecting the locking and turning of the crankshaft. In case of back fire the ball instantly recedes into the groove, thus permitting the pulley to turn free without engaging the clutch.

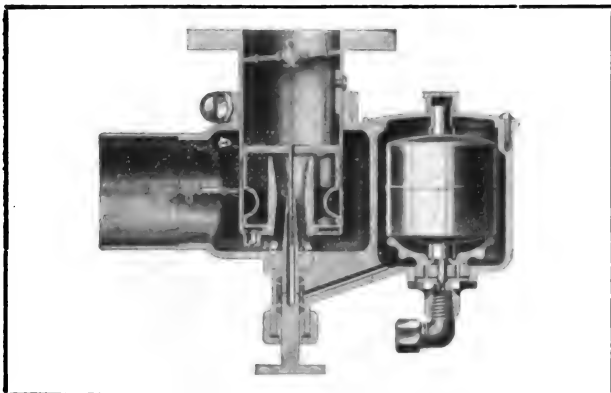
The pulley has 15 points of engagement, which insures positive action at the slightest pull. Tests have proven that a pressure of 700 pounds cannot effect the ball, and that the leverage is so distributed that a pull of 10 pounds on the lever will turn over a compression of approximately 200 pounds at the crankshaft. The usual hand crank may be retained on the car and should it be found necessary to use it, the operator is absolutely protected against back fire. The Dadco starter is fitted to the crankshaft, replacing the fan pulley, and it can be attached by any mechanic, as explicit instructions are furnished. The retail price of this device is \$10.

BRAD-KENT CARBURETOR.

Carburetor, Made by the Frost Manufacturing Company, Which Was Tested by Chicago Club on a Ford Car.

The Frost Manufacturing Company, Kenosha, Wis., manufactures a carburetor that is designed especially to meet the requirements of the model "T" Ford motor.

The carburetor is of the float feed type, with the float chamber being cast on one side of the main body, and a notable feature is that there is only one other moving part. This is a movable piston which slides easily in the mixing chamber, and at low throttle rests over the venturi. The piston is perforated at the top and also has the tapered needle valve attached to it. The needle fits into the fuel well at the bottom, and as the piston rises under suction, the needle is drawn further out of the mouth of the well, which admits of a larger supply of gas to the mixing chamber. There are no openings at the bottom of the piston and, as stated above, it rests easily over the venturi. The bottom of the mixing chamber is fitted with a ball check valve, through which a certain amount of air will enter when the pressure is high enough, forcing the piston to rise and automatically supply the gas. The main air supply is at the base of the venturi, and when the motor is running at low throttle the only air entry is at the small holes at the base of the venturi. Eight square secondary air ports are



Brad-Kent Carburetor.

cut in the walls of the mixing chamber, and corresponding ports are cut in the piston. When the pressure is sufficient the piston will rise to a position where these ports will meet in alignment, thus allowing a great amount of air to enter the mixing chamber. The opening in the ball check valve is so calculated as to allow only a certain amount of air to enter under the piston at one time; when the throttle is thrown open quickly the air cannot rush into the valve and force the piston up. This method eliminates backfiring by preventing a lean mixture on the first suction. There is but one adjustment on the Brad-Kent carburetor, the spray of gas being regulated by a small hand wheel at the bottom. A second butterfly valve at the mouth of the mixing chamber controls the emission of gas to the cylinders. This carburetor comes complete with a special manifold, hot air tube and stove to clamp around exhaust, for \$12.50.

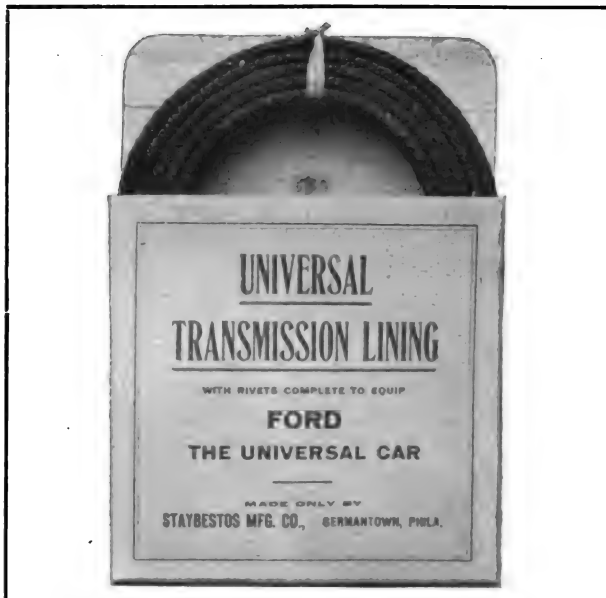
SPECIAL PRICE FOR BRAKE LINING.

Staybestos Manufacturing Company Makes Reduction of Price for Trial Orders from Owners.

The Staybestos Manufacturing Company, Lena and Armat streets, Germantown, Philadelphia, is making a special offer that will interest owners of Ford cars. This is the sale of a trial set of linings for the bands of the transmission gearset of the machines, the price being fixed at 50 cents, which represents a factory reduction of 25 cents from the regular price.

Sold under the trade name of Universal Transmission Lining, a set consists of three pieces of standard Staybestos lining, each of which measures in inches

22½x1½x5/32. The set is, as is shown in the accompanying illustration, packed in a carton with a sufficient number of rivets to attach all three pieces, and is in readiness for installation. The company is making this offer



Universal Transmission Lining for Ford Chassis.

for a limited time, and it is therefore advisable for interested readers to write immediately, or call upon the nearest dealer.

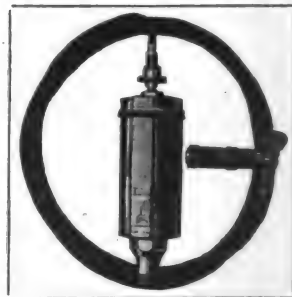
UTILITY JUNIOR PUMP AND PNEU-METER.

A Spark Plug Tire Pump Which, Attached to a Ford Car, Quickly Inflates Tires to Proper Pressure.

The Hill Pump Valve Company, 18-20 E. Kinzie street Chicago, Ill., produces two sizes of motor driven tire pumps, and with these pumps supplies an automatic Pneu-Meter, which absolutely prevents over-inflation of tires. The pump and Pneu-Meter illustrated is designated as the Utility Junior, and is intended for Ford and other light cars that are equipped with tires to 3½ inches in diameter.

The pump is easily attached to the spark plug and the tire valve, and is provided with a flexible tube tested to 1500 pounds pressure. The controlling device, the Pneu-Meter, automatically closes the valve when a predetermined pressure has been reached, and provides an outlet for the air that is thereafter pumped. This escaping air gives off a shrill, whistling sound, which serves as a warning to the motorist that his tires are inflated to the proper point. The Utility Junior Pneu-Meter is adjustable to pressure ranging from 40 to 80 pounds; the larger pump has a range of from 50 to 125 pounds. Both sizes are similarly adjusted, simply by revolving the outer sleeve of the controller until the figures on the sleeve register so as to show the pressure desired.

The Utility Junior Pump and Pneu-Meter sells for \$6 complete. The Pneu-Meter can be bought separately, however, at \$2 each. Further particulars can be obtained from the company, and this publication should be mentioned by the inquirer.

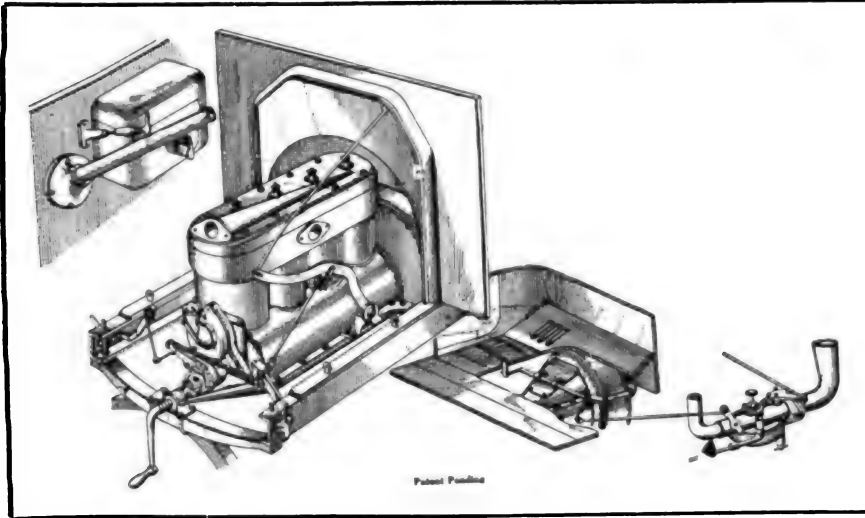


Utility Junior Pump and Pneu-Meter.

HUNTER FORD CAR STARTER.

An Efficient and Guaranteed Device by Which the Ford Motor Can Be Cranked from the Seat.

The Hunter Auto Supply Company, 333 W. Madison street, Chicago, Ill., is selling a starter for Ford motors. This device is somewhat different from the ordinary type



Hunter Ford Car Starter Installed on the Motor—Foot Control Assembled.

In that the motor is cranked from the seat. This is operated by drawing a handle on the front dash towards the seat and then releasing it to be drawn back into position by spring pressure. The accompanying illustration clearly shows the device installed on the motor.

An attachment operated by a foot pedal controls the air intake on the carburetor, which may be closed so that the engine may be started at its lowest temperature. This is an especially desirable factor in cold weather. The installation of the Hunter starter is quite simple and it may be attached by the novice in about an hour's time. The starting crank does not have to be removed. This apparatus retails for \$10 and is guaranteed to give long and reliable service.

FORD HOOD ANTI-RATTLER.

A Helical Spring Device That Positively Prevents Rattling of Ford Hoods.

One of the latest specialties manufactured by the Auto Parts Company, Providence, R. I., for the Ford car, is a hood anti-rattler. This attachment consists of a suitable length of helical spring and two clamps, the spring being placed under the hood and the clamps attached to either side. The tension of the spring is sufficient to retain the sides of the hood when partially or wholly raised. It also possesses a most desirable quality in that both sides may be raised at the same time, which makes for convenience when making adjustments to the engine. This device is very valuable in hot weather, especially when it is necessary to use the low gear to any extent, inasmuch as it permits the sides of the hood to be slightly raised, so that an extra supply of air is allowed to circulate around the motor, thereby assisting the cooling. Installation is extremely simple. It is finished in black enamel and retails at 10 cents each.



Apco Hood Anti-Rattler.

DIAMOND CARBURETOR FOR FORD CARS.

New Instrument Shows Marked Efficiency and Economy in a Lengthy Demonstrating Tour.

The Diamond Carburetor Company, Inc., Colgate and Mercer streets, Jersey City, N. J., is manufacturing a carburetor specially designed for Ford cars, for which very broad claims for efficiency and economy are made. This is known as the New Diamond, model "C," and the guarantees with which it is sold include the following: That with it a Ford motor will be easier starting, that it can be throttled very low, with the high speed clutch engaged, that it will have a fast getaway, more speed, greater power at the wheels, perfect flexibility; that it will give at least 20 miles to the gallon of gasoline and, last, but not least, the elimination of "bucking" of the motor at low or high speeds.

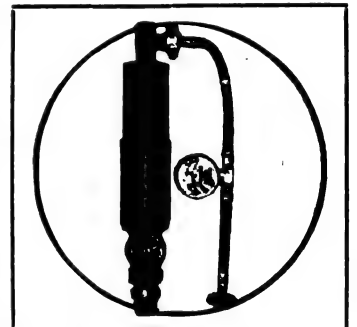
Recently a test was made with a Ford car equipped with a model "C" carburetor over a distance of 336 miles, which started at the factory and ended at Boston. The first 50 miles were made through a blizzard. Demonstrations were given to dealers along the route and on arrival at Boston examination of fuel and lubrication showed that 13½ gallons of gasoline and three quarts of oil had been consumed. This was an average of better than 24 miles to the gallon of gasoline. The running time of the trip was 11 hours.

These carburetors are sold for \$10 when old carburetors are taken in exchange. If full satisfaction is not given within 30 days after the carburetors are received, the company guarantees to refund the full purchase price and return the old carburetor, and also to pay the charges on the Diamond carburetor returned. This firm also manufactures special carburetors for Overland, Oakland, Buick and Babyolds machines.

MAYO FORD PUMP.

Mayo Spark Plug Tire Pump for Ford Cars Is Guaranteed to Work Efficiently.

The Mayo Manufacturing Company, 64 East 18th street, Chicago, Ill., is producing a spark plug air pump designed especially for the Ford motor. The company guarantees that only fresh air will be pumped into the tire by this device, and that it positively cannot injure the motor or the tire. The installation is simple, it being necessary to remove only the spark plug and screw the pump in place. After fastening it securely to the cylinder, the air-hose can be attached both to the tire and to the pump. The motor is then started at low throttle, and run slowly until the tire is sufficiently inflated. There are no parts to be adjusted, and the only care that the pump requires is an occasional drop of oil. The principle of operation is similar to that of larger cylinder pumps, there being a small piston fitted with rings, which has a suction and compression stroke. The pump is 10 inches in length and comes complete, including 10 feet of high quality air hose and a pressure gauge. The price is set at \$8 for the complete unit.



Mayo Ford Tire Pump.

PRACTICAL FACTS FOR NEW CAR OWNERS.

Complete Data Relative to Generally Maintained Traffic Regulations—Readers Queries—Suggestions as to Repairs and Operation.

THE government of street traffic has become one of the most pressing matters in civic administration. Operators of automobiles and other vehicles can be of great assistance in this most vital problem. Each driver should understand thoroughly the rules and regulations of road traffic that have become generally recognized throughout the country. Some municipalities, of course, have special rules to govern special conditions, but the following will serve as a general guide:

Passing, Turning, Stopping, Standing, Starting.

A vehicle, except when passing another going in same direction, shall keep to the right and

to another, where there is two-way traffic, shall head in same direction as traffic on that side of street.

On two-way streets heavy and slow vehicles shall keep as close to right hand curb as possible, to allow rapid moving and lighter traffic to proceed independently.

On all streets having a single track, vehicles desiring to pass a street car, stopped on near side of intersection, must move to the left of the street car, except where traffic officer directs otherwise.

On all streets having double car tracks, vehicles proceeding to right of street car must come to stop when street car is stopping on near side of street intersections, and remain at standstill until street car is started unless traffic officer directs otherwise.

No vehicle should pass to the left of a street car on streets having double tracks.

No horse or vehicle should be driven, propelled or allowed to stand on any sidewalk, except for purpose of crossing same when necessary, and then only in the shortest possible way from street to abutting premises.

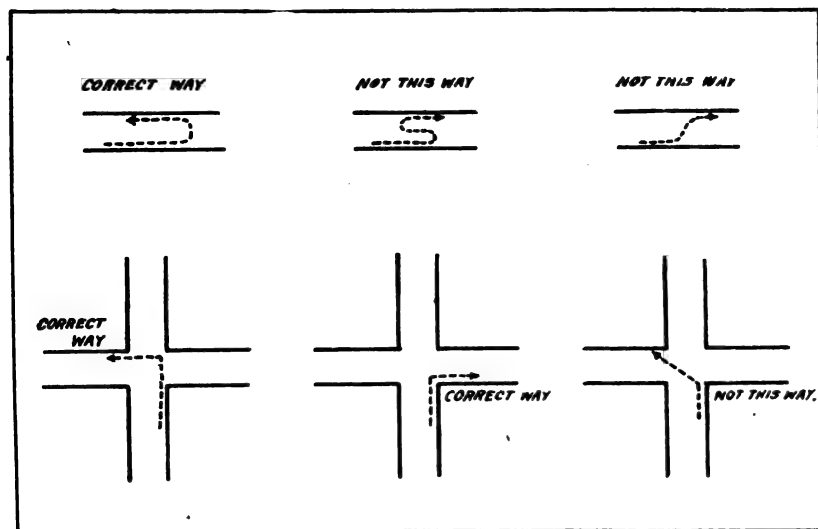
No vehicle shall emerge from an alley, stable, garage or other area or building abutting on a sidewalk at a pace faster than a walk.

A signal shall be given by all vehicles to those behind when slowing or stopping, by raising the hand horizontally when physically possible.

A visible or audible signal shall be given by all vehicles when turning while in motion, or in starting to turn from a standstill, indicating the direction in which turn is to be made.

Before backing, ample warning shall be given by visible or audible signal, and while backing watch carefully to avoid injuring those behind.

Vehicles must stop in such a way as not to interfere with passage of pedestrians at crossings, always avoiding projection of horse or ve-



Correct and Incorrect Methods of Turning Corners and Crossing the Thoroughfares.

as near the right hand curb as possible.

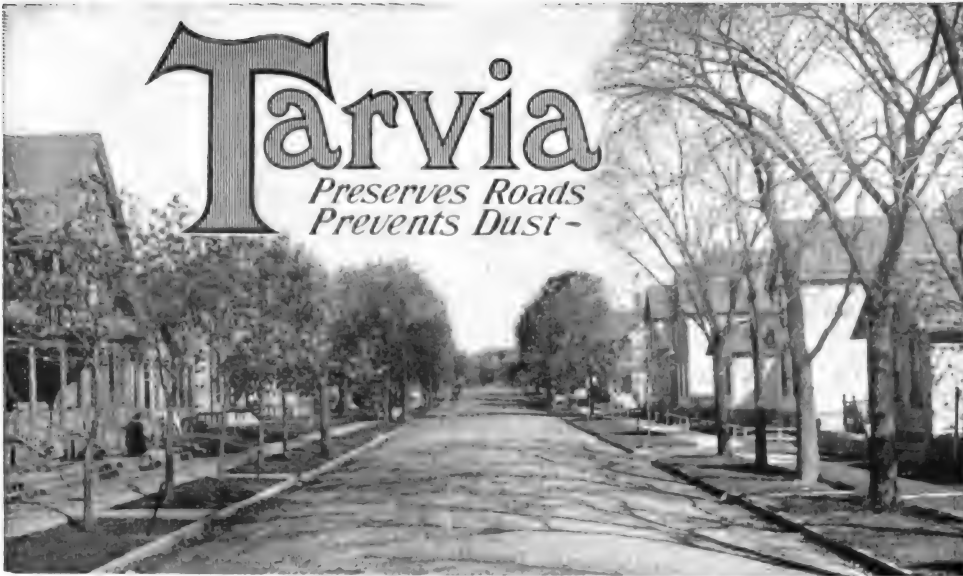
A vehicle overtaking another shall pass to the right.

A vehicle overtaking another shall pass to the left, and not pull over to the right until so far ahead as not to interfere with progress of vehicle passed.

A vehicle turning into another street to the right shall turn corner as near right hand curb as practicable.

A vehicle turning into another street to the left shall turn around intersection of the centre line of the two streets.

A vehicle crossing from one side of the street



Milwaukee likes Tarvia—

*Third Ave., Milwaukee, Wis.
Treated with "Tarvia B".*

Scores and scores of towns use Tarvia year after year to maintain their macadam roads and suppress the dust nuisance.

The experience of Milwaukee is typical and we will let Mr. Charles O. Davis, of the Department of Public Works, speak for himself.

"During 1913 the City of Milwaukee purchased 40,000 odd gallons of your 'Tarvia B' product. This year (1914) we used 150,000 gallons. These figures show what we think of 'Tarvia B'.

"We have applied this material on tar penetration streets which had begun to ravel, and found that with a very good covering

of this material the raveling was stopped, and gave to the road a nice, smooth surface.

"Our experience also on waterbound macadam streets is satisfactory and the streets show up fine. One application sets up the surface, keeping out all water, with the result that the road is kept in good condition as well as it eliminates the dust nuisance.

"In closing we heartily recommend 'Tarvia B' for treatment where good results are required."

Tarvia is so low in price and adds so much to the life of the roadway that it has become a necessary feature of an economical road plan.

Booklets telling about the treatment free on request. Address nearest office.

Special Service Department

This Company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by anyone interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity the matter will have prompt attention.

BARRETT MANUFACTURING CO.

New York Chicago Philadelphia Boston St. Louis
Pittsburgh Detroit Birmingham Kansas City Minneapolis
THE PATERNON MFG. CO., Limited: Montreal, Toronto, V.

TRADE MARK
B
natti
le
allfax, N. S., Sydney, N. S.

(When Writing to Advertisers)

Journal.)

HOTEL LONGACRE

Broadway & 47th Street

**More Like a Club Than a Hotel
Exclusively Bachelor**

Convenient to Everything. The refined air and good service of a club.

RATES PER DAY

50 rooms with lavatory....\$1.00

150 rooms with private bath 1.50

50 rooms with private bath 2.00

Two-room Suites, \$3.00 to \$4.00

Special Weekly Rates

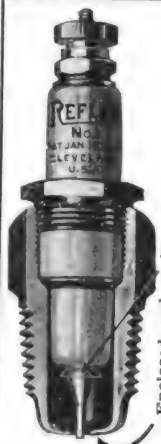
Restaurant a la carte.

Club Breakfasts.

Dining room Open to Ladies.

**The best value in New York City
both in rooms and restaurant.**

Phone, 7790—Bryant
J. G. BOGGS.



Perfect Ignition Guaranteed by Using

REFLEX SPARK PLUGS

EVERY Reflex plug is sold under a guarantee of perfect satisfaction after 80 days' trial...or return it and get your money right back, without argument, explanation or delay.

EVERY Reflex plug has our patent Baffle that reflects the soot and dirt away from the interior and out through the spark gap at every explosion. In connection with the enclosed end this makes Reflex plugs practically self-cleaning and long-lived.

Used by 16 leading automobile and motorcycle manufacturers. We sell direct where we have no dealer. Write for Catalog and prices.

C. M. FOSTER, Sales Agent
51 Bowker St. Boston, Mass.
THE REFLEX IGNITION CO., Cleveland, O.

Write for full particulars



SUPERIOR MANUFACTURING

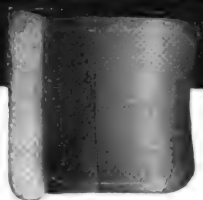
**Why Freeze Yourself?
Ruin Your Auto?**

**The Superior
Freezer Heater**

CIN
Seat
B. H.
An

(When
file

Don't Ruin Your Tire Casings



Save Them With These Rim-Cut Patches

You can prolong the life of expensive casings--you can save annoying tire changes--by applying a Goodyear Rim-Cut Patch to casings that are weakening.

Many get hundreds of extra miles from a casing this way. Many tubes are saved from blowouts. And these Goodyear Rim-Cut patches are so quickly applied and so inexpensive. It is folly for you to drive without them. This Rim-Cut Patch fits inside the casing. The patch is heavily reinforced to prevent blow-out along rim, or any other cuts or likely blowout spots. Learn more about these Goodyear Tire Savers--there are 22 in all. We gladly send you book with instructions for applying. Address Desk 46.

GOODYEAR
AIRCORP. CORP.

The Goodyear Tire & Rubber Co., Akron, Ohio
Makers of Goodyear Automobile Tires (2438)



WHY USE INFERIOR PLUGS WHEN CENTERFIRE

can be bought at the same price? They overcome all Engine troubles, fire where others fail and **Add Power** to engine. Any length point desired made to order. Try them and you will use them--always. Make a trial and save money. \$1.00 each, 6 for \$5.00.

GUARANTEED

Agents wanted and special prices to dealers.

Milwaukee Auto Specialty Co.
705-707-709-711 Chestnut St., Milwaukee, Wis.

F. SHIRLEY BOYD

175 Massachusetts Ave., Boston, Mass.

R. I. V. Ball Bearings.

Baldwin Chains and Sprockets.

J. H. Sager Line.

For Perfect Control and Safe, Comfortable Driving use

Weed Anti-Skid Chains

At all Reputable Dealers

WEED CHAIN TIRE GRIP COMPANY, BRIDGEPORT, CONN.

*Hartford

SHOCK ABSORBER

SOOTHES THE ANGRY SPRING

Hartford Suspension Co.

Jersey City, N. J.

(In The Automobile Journal.)

Caste

Owned and driven by owners of the superlatives among motor cars and in its first season found in use by the most exclusive and particular buyers in America, the

Scripps-Booth

has proven consistent in every part, and in every performance, with the standards of luxury and service to which its buyers are accustomed.

From its quiet motor and restful springs to the beautiful art lines and wonderful equipment, both essentials and minute details unite in absolute completeness of motor-car construction.

You will enjoy an investigation of this new construction.



*Scripps-Booth Co.
Detroit, Mich.*

hicle within five feet of crossing.

Patrolmen when halting traffic will face the line of traffic to be halted, extend arms at angle of 90 degrees, palms of hand outward. When traffic has stopped, arms will drop to side.

Every operator of motor vehicle shall sound his horn when overtaking any person, vehicle, horse or other animal upon a highway, and shall sound horn when approaching street crossing, rounding a curve or corner, or places where any sign appears, such as "Danger—Blow Your Horn."

The use of muffler cut-out upon motor vehicle or any other vehicle is prohibited in a majority of cities.

In starting, a little smoke is sometimes unavoidable, but continuous smoke is not, and is prohibited generally.

When signalled to do so by driver of horse or other animal, operator shall stop motor vehicle, and, if required, shall stop his engine until all danger has been avoided.

In case of injury or damage to person or property, due to operation of a vehicle, operator or driver of vehicle shall stop, and, upon request of person injured, or any one present, shall give his name and address and that of the owner of vehicle.

Any operator of any vehicle shall stop upon request of police officer in uniform or exhibiting his badge. Any operator shall exhibit certificate and license upon request, and shall furnish all information as to his identity and that of the car owner.

Right of Way.

Police, fire department, fire patrol, traffic emergency repair, United States mail vehicles and ambulances for persons and animals shall have the right of way in any street and through any procession.

Physicians' vehicles bearing "Red Cross" or insignia of the profession will be permitted to pass by traffic officers as soon as possible and not be unnecessarily delayed.

The driver of any vehicle proceeding upon the track in front of street car shall turn out upon the signal by motorman or car driver.

A vehicle waiting at curb shall promptly give way to another about to take on or let off passengers or merchandize.

Driver of vehicle, on approach of fire engine or other fire apparatus, shall immediately draw vehicle as near as practicable to right hand curb, parallel thereto, and come to a standstill.

During blockades and stoppages a space shall be kept open between all street cars at crossings.

(When Writing to Advertisers Please Mention The Automobile Journal.)

Meet me at the
Tuller

For Value,
Service, Home
Comforts



New HOTEL TULLER
Detroit, Michigan

Center of business on Grand Circus Park. Take Woodward car
get off at Adams Avenue.

ABSOLUTELY FIREPROOF

200 Rooms, Private Bath, \$1.50	Single, \$2.50	Up, Double
200 " " " 2.00	3.00	" "
100 " " " 2.50	4.00	" "
100 " " " 3.00 to 5.00	4.50	" "

Total 600 Outside Rooms. All Absolutely Quiet.
Two Floors—Agents' New Unique Cafes and
Sample Rooms Cabaret Excellence



SPEDOLENE solves the problem of automobile
and motor truck gear lubrication. One trial
is all we ask. "A fair field and no favor"
will demonstrate to your satisfaction that
SPEDOLENE is the King of all lubricants for
gears.

Henry H. Kroh, Boston Distributor,
MANUFACTURED BY
Continental Asbestos Corporation, Worcester, Mass.

MOTOR PARTS COMPANY
OFFICIAL
BOSCH DISTRIBUTOR

Zenith Carburetor Mohawk Tires Leak-Proof Rings

185-187 Columbus Avenue, BOSTON
818 No. Broad St., PHILADELPHIA SPRINGFIELD, MASS.

Peerless Quality in Smaller Size

"ALL PURPOSE" FOUR AND SIX
FOUR AT \$2,000 (Sixes \$250 Extra)

THE PEERLESS MOTOR CAR CO., CLEVELAND, OHIO

Makers also of the "48-Six" and Peerless Trucks.
Licensed under The Kardo Patents.

**AUTOMOBILE
ELECTRIC LIGHTING SPECIALTIES**

For the Automobile Owner and Manufacturer
who wants SERVICE for his money

ELECTRIC LIGHTING SPECIALTIES Made to Order
CULVER-STEARN'S MFG. CO.
Worcester, Mass. Detroit, Mich.

(When Writing to Advertisers Please Mention The Automobile Journal.)

Funeral processions on their way to cemetery have right of way over other vehicles, and the latter are forbidden to drive through them, except such vehicles as mentioned in first paragraph of this section.

Drivers of all vehicles must look out for and give right of way to vehicles approaching from their right at street intersections.

Speed.

No vehicle shall proceed at greater speed than the law allows and is safe and proper under conditions then obtaining. Where "Danger—Run Slow" signs appear, speed must not exceed legal minimum speed.

No vehicle shall cross any street or avenue, or make any turn at a dangerous speed, and shall not exceed the legal limit.

No person shall operate a motor vehicle recklessly, and only at a rate of speed that is proper, considering traffic at the time and the width of the highway so as not to endanger life and property.

Before leaving any motor vehicle unattended out of sight, driver shall stop engine, disengage it and set emergency brake; or, if an electric vehicle, he must remove plug and set emergency brake.

Vehicles.

No vehicle shall be stopped or commence to unload on any car track street so as to arrest passage of street cars.

No one in any street or highway shall drive a vehicle that is so covered in or constructed as to prevent the driver thereof from having sufficient view of traffic at the sides and in front of such vehicle.

No one shall drive or conduct any vehicle in such condition, or so constructed or so loaded as likely to cause accident or injury to man or beast.

No one shall load a vehicle with iron or other material without deadening, so that the material may not strike together and cause unnecessary noise.

No one shall load any vehicle with ashes, coal, mortar, snow or similar material so that the matter is scattered along the streets. Drivers of such wagons are liable to arrest.

Rights of Drivers and Pedestrians.

Roadbeds of highways and streets are primarily intended for the use of vehicles, but pedestrians have right to cross them in safety, and drivers of vehicles must exercise all possible care not to injure. Pedestrians should never step from sidewalk to roadbed without first looking to see what is approaching, and should not heedlessly interfere with passage of vehicles.

Hand drawn vehicles and pedestrians should habitually cross street intersections only and at right angles, as promptly as possible.

Pedestrians must be cautious, particularly in crossing alleys and obvious entrances for vehicles into buildings and areas.

Lights on Vehicles.

All vehicles must carry between sunset and sunrise a light or lights in a conspicuous position, so as to be readily seen from front.

Motor vehicles from one hour after sunset until one hour before sunrise must show at least two white lights, visible not less than 200 feet in direction vehicle is going, and except upon motorcycles, one red light visible in opposite direction; motorcycles need display only one white light in direction they are going.

Light of the rear signal lamp must be thrown on rear license tag; and said tag must be kept clean from oil, grit and mud.

Definitions.

Word "vehicle" includes equestrians, horses hitched to vehicle and everything, including gasoline and electric cars, on wheels or runners, except street cars, invalid chairs and baby carriages.

Word "driver" includes the rider and driver of a horse, rider of bicycle and operator of motor vehicle or street car.

Word "curb" shall mean the lateral boundary of that portion of street designated for use of vehicles, whether marked by curbstones or not so marked.

READERS' QUERIES

Suggestions To Owners---How to Remove Drive Shaft, Explanation of Two Cycle and Four Cycle Action, How to Silence a Noisy Hood, Description of Irreversible Steering Gear.

Removing a Drive Shaft—F. L. Willow, California.

I am the owner of a 1912 ——— touring car which I have remodelled for a delivery wagon and of late I have had a great deal of trouble with the universal joints on the drive shaft. Recently the pin on the shaft sheared off and it is now necessary to remove the shaft so that a new pin may be fitted. I have tried to take the shaft out, but am told that the only practical method is to remove the rear construction. This will require time and cost money, and as I want to avoid expense you may be able to suggest a way of making a repair that will be economical.

As the construction of chassis vary it is impossible to say whether or not the method which the writer has in mind will be practical with

(When Writing to Advertisers Please Mention The Automobile Journal.)

HOTEL MAJESTIC

Central Park West at 72nd St.,
New York

Copeland Townsend, formerly Manager of the Hotel Imperial, New York, is now proprietor of the Majestic.

Overlooking Central Park and away from the noise and heat of lower Broadway, the Majestic offers to motorists a haven of quiet and rest after a tedious journey. During the summer season small suites consisting of sitting room, bedroom and bath may be secured at very low prices.

The Cafe Moderne and the roof garden, offer dancing nightly.

NOTICE FOR OWNERS AND CHAUFFEURS:

Coming into New York via Broadway, or down Fifth Ave., you will find this hotel conveniently located at the 72nd St. entrance to Central Park. A splendid garage just around the corner.

COPELAND TOWNSEND
Managing Director

Why Pay Excessive Hotel Rates?

THE NEW AMSTERDAM

Euclid Avenue at 22nd Street, CLEVELAND, OHIO

A five minutes walk from the active centres, yet overlooking the most beautiful residence section of Cleveland.

"The logical resting place for tired Tourists."

Large airy suites of from two to five rooms (also single rooms.)

GARAGE NEARBY

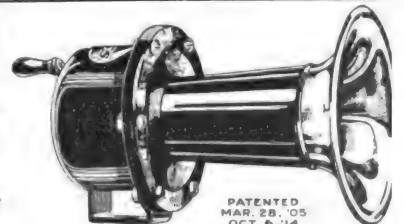
RATES:—\$1.50 per day, each person
Dining Room Modified *a la Carte*

A. A. McCASLIN, Managing Director

L. McNAMARA, Manager

\$4⁰⁰
SEISS

Model A
Double Acting



The Only Hand Operated Horn
With the Motor Driven Sound

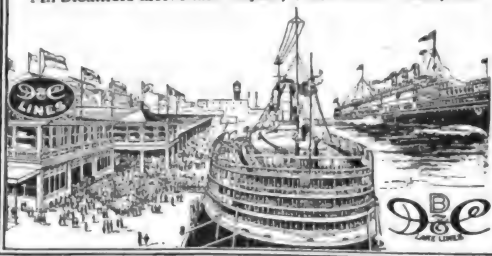
At your dealer's or direct from factory—with 10 year guarantee only \$4.00.

SEISS MFG. CO., 445 Dorr St., Toledo, Ohio

THE COAST LINE TO MACKINAC
 DETROIT, CLEVELAND, BUFFALO, PT. HURON, ALPENA, NIAGARA FALLS, TOLEDO, ST. IGNACE.

A LAKE TRIP FOR REST AND RECREATION
 Have a real vacation on the Great Lakes, the most enjoyable and economical outing in America. The cool lake breezes, the ever-changing scenes along the shore, and the luxurious steamers of the D. & C. Line are positive guarantees that you will enjoy every minute of your trip, and return home refreshed and glad you went. Daily service between Detroit and Cleveland and Detroit and Buffalo. Four trips weekly from Toledo and Detroit to Mackinac Island and way ports. Two trips weekly, special steamer, Cleveland to Mackinac Island, no stops enroute except Detroit and Alpena. Special day trips between Detroit and Cleveland during July and August. Daily service between Toledo and Put-in-Bay. RAILROAD TICKETS AVAILABLE FOR TRANSPORTATION on D. & C. Steamers between Detroit and Buffalo or Detroit and Cleveland either direction. Send two-cent stamp for illustrated pamphlet and Great Lakes map. Address L. G. Lewis, G. P. A., Detroit, Mich.

Detroit & Cleveland Navigation Company
 Philip H. McMillan, Pres., A. A. Schantz, V. P. & G. M.
 All Steamers arrive and depart, Third Ave. wharf, Det.



American Made for American Trade
New Departure
Ball Bearings
THE NEW DEPARTURE MFG. COMPANY,
BRISTOL, CONN.

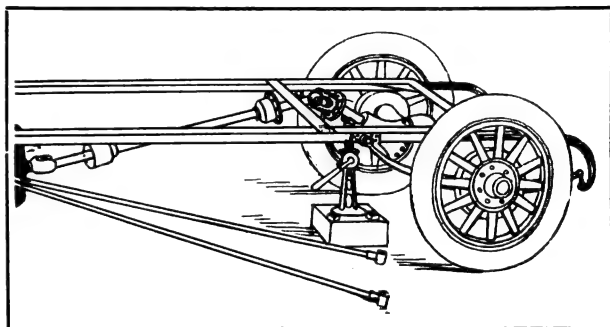
TRADE MARK
Raybestos
REG. U.S. PAT. OFF.
"THE ORIGINAL AND BEST ASBESTOS BRAKE LINING"
THE ROYAL EQUIPMENT CO., BRIDGEPORT, CONN.

DIXON'S
GRAPHITE GREASE NO. 677
For Transmissions and Differentials
 stops ruinous metal-to-metal contact and lets graphite ride on graphite. Booklet No. 210 G.
 Made in Jersey City, N. J., by the
JOSEPH DIXON CRUCIBLE COMPANY
 Established 1827 G. 39

REXO II \$3⁸⁵
THE GARFORD MANUFACTURING COMPANY, 2506 Olive St., ELIZIA, O.
 Successors to THE DEAN ELECTRIC COMPANY.

(When Writing to Advertisers Please Mention The Automobile Journal.)

yours, but as it has been successfully used many times, it is worth a trial. The universal joint is constructed usually of two large steel or bronze bushings, which fit freely upon the drive shaft pin. The end of the drive shaft is shaped like a ball and through which passes the pin. Both universal covers should be forced back out of place and the bushings removed. Next place a jack under the front section of the differential and gradually raise it. During this operation the drive shaft should be pushed forward so as to favor the lifting as much as possible. As the springs fasten to a movable sleeve on the axle housing, it will not be necessary to disturb the spring shackle bolts in any manner. If care is taken when using this method the shaft should



Jacking a Chassis Frame to Reach a Universal Joint, Instead of Removing Entire Rear Construction.

be lifted as is illustrated in the accompanying sketch.

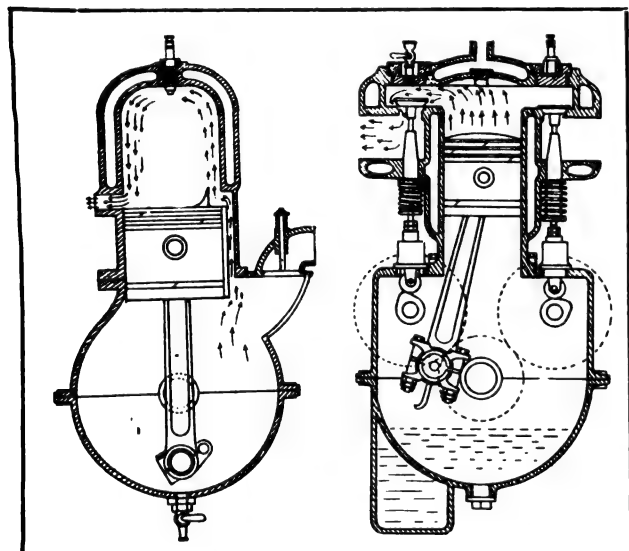
Two-Cycle Vs. Four-Cycle Action—T. H., Los Angeles.
 Will you kindly publish in the next issue of the Automobile Journal why the two-cycle motor is not more generally used on automobiles? Personally I cannot see why it should not develop more speed and power than the other type.

To secure highest efficiency from either a two or four-cycle motor, it is essential that a fuel mixture of proper proportion should enter the cylinder, be compressed by the piston, and then ignited at the right time. It is also imperative that all the burned gases should be ejected before another supply of mixture is taken in. The performance of these functions is found much more difficult in the two-cycle motor than in the four, as they must take place in exactly half the time. This type also lacks the exhaust stroke, which is a valuable asset to the four-cycle, as it forces out the old charge and leaves a clear cylinder for the new gas to enter.

It has been found by experience that the two-cycle motor cannot attain the speed which is possible with the four, as it has a tendency to choke because it cannot fully expel the burned gases. To make this clearer, the two types of motors are

shown in the accompanying illustrations. The two-cycle motor is shown with the piston at the end of the power stroke, the exhaust and intake ports being open. It will be noted that the burned gases must exhaust simply by its own pressure except for a possibly slight help from the incoming mixture.

The four-cycle engine is shown with the piston going up on the exhaust stroke, thereby affording a positive pumping means by which to eject the gases. This is not the only problem which confronts the engineers, as very large ports could be used on the two-cycle type. By referring to the sketch it will be seen that the exhausting and admission of new gas takes place at the same time. There must be no mixing of the two and it is also essential that too much pressure must not be exerted by the new gas in expelling



Two-Cycle Motor, Showing the Intake and Exhaust Ports Open—Four-Cycle Motor Showing the Piston Expelling the Burnt Gases.

the old as much of the good mixture is liable to be included in the escaping charge. It is also imperative that the burned gas shall have lost the greater part of its heat before the new is admitted, inasmuch as it is liable to cause ignition.

Cleaning Reflectors—R. H. B., Newton, Mass.

Will you kindly let me know what is the best way to clean reflectors, so as to retain their brightness, without removing them from the lamps or from the car? They are spotted with mud, etc., and I would like to do it myself.

A thick lather made of luke warm water and common soap and applied with a soft sponge is one of the cheapest and most effective methods of cleaning reflectors. Be careful not to scratch. Rinse with clear water and permit to dry, after

(When Writing to Advertisers Please Mention The Automobile Journal.)

DIXIE 20TH CENTURY MAGNETO

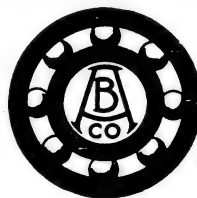
With DIXIE equipment there is no bothering with batteries—no careful nursing when position of advance lever is changed—just a high-tension magneto, self-contained and independent, which *penetrates* its charge with a *full* spark at the lowest as well as the highest speeds.



SPLITDORF Electrical Co.

NEWARK, N. J.

(All SPLITDORF features are fully covered by patent or patents pending)



BALL BEARINGS REGROUND

at one-fifth the cost of new, also New Single Row Annular, Thrust, New Departure Double Row and Radax Bearings.

AHLBERG BEARING CO.

Boston Chicago Detroit New York
Los Angeles Cleveland St. Louis, Mo.

VALVOLINE OIL CO.

Heavy, Medium and Light

Automobile Oils

27 STATE STREET BOSTON, MASS.

ALDING PORCELAIN PLUGS



Regular
75c Value

50c
EACH

Write for a gallon of the famous
"ALDING" Oil, in "DUCK" Can, 75c Delivered
ALSTEN & GOULDING COMPANY
36 Foster Street, Worcester, Mass.

HARRIS

TRADE MARK REG. U.S. PAT. OFF.

OILS AND GREASES

GREATER EFFICIENCY AT LESS COST

No constant cleaning of soot deposits from cylinders; no difficulty in starting because plug contacts are gummed up with oil and carbon; no extra repairs from injury because of inferior lubricants.

What you do get is easier operation and a smoother running engine. In fact, greater efficiency at less cost results from the use of HARRIS OILS. They are made with the utmost care by experts—made from the highest quality Pennsylvania crude oil.

"A Little Goes A Long Way And Every Drop Counts."

We make a special oil for Steam Driven Motor Cars.

A. W. HARRIS OIL CO.
326 S. Water St.,
Providence, R. I.
 Branch: 143 No. Wabash Ave.,
 Chicago, Ill.



HAVOLINE OIL

"It Makes a Difference"

Garageman: "So, if you were in my business you'd carry HAVOLINE OIL?"

Motorist: "Yes Sir, I would. And furthermore, the manufacturer of my car recommends it for more mileage, less carbon and longer service."

Garageman: "Well, you're not my only customer that demands it."

Motorist: "You bet I'm not! It is the best advertised oil on the market. Everyone knows the blue-and-white can."

INDIAN REFINING COMPANY
 17 Battery Pl. Dept. L New York



Be sure you sell the oil in the Blue-and-White Can with the inner seal. We offer the garagemen the best packaged goods proposition on the market. Write for our representative or for full information. Be sure and write for the "Sales Order."



"Don't Gamble With Safety"

Demand the Improved, Guaranteed

S-M-C Asbestos Brake Lining

Sold by all dealers or direct by manufacturer
STAYBESTOS MFG. CO. Germantown, Philadelphia, Pa.

TEXACO

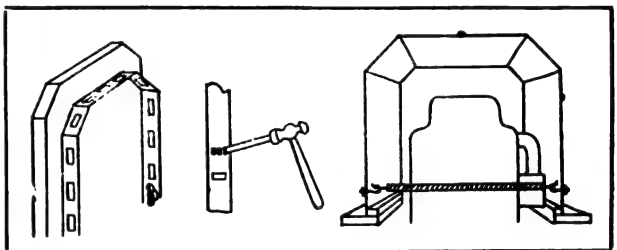
MOTOR OIL

When Writing to Advertisers, Please Mention The Automobile Journal.

which polish with any reliable substance—Bon Ami or ordinary brass polish have been used with good effect, the polishing, of course, being done with a soft cloth. Inasmuch as the water will not damage the lamp, the reflector does not have to be removed.

Noisy Hoods—Constant Reader, Lowell, Mass.
 How can I stop the rattling of the hood on my? It is a long one and the side clasps appear to be tight. When running over cobble stones the noise is especially annoying. The side doors of the body are also noisy. I placed leather strips between the doors and the posts, and while this was effective at first, the noise quickly returned. Anything that you may suggest will be greatly appreciated.

There are several methods employed for eliminating the noise caused by loose hoods. A hood strap, which is attached to brackets fastened in the wood portion of the frame, is one of the most common means. A better plan, however, is to equip the dash and radiator supports with some anti-noiseless material, such as leather, or rawhide. This method has been generally adopted by manufacturers. It consists of cutting a number of slots in the supports and then winding the



Lacing Hood Support for Silence (at Left), Method of Making Slots (at Centre), Silencing Hood by Means of Spring (At Right).

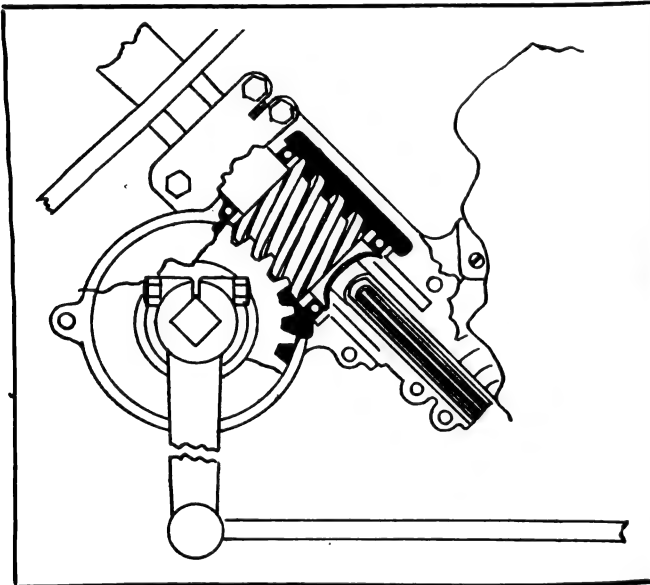
lace through them, as shown at the left of the illustration. The centre figure shows a method for making the slots. Drill two or three small holes, about 3/16 of an inch in diameter, and then break out the edges by means of a small chisel. The rough edges can then be smoothed off with a fine file. The lacing can be knotted on the inside so as to form an anchorage.

Another effective method, if permissible, is to attach hooks at opposite points to the inside of the hood and then connect the two by an ordinary screen door spring. This will always keep a strong tension on the hood and prevent it from rattling under most conditions. To insert the hooks, it is necessary to drill two small holes the diameter of the hook and then secure the latter on the outside by means of a nut. This is shown at right of illustration. The most satisfactory way of silencing a door is, of course, to have the member refitted.

THE AUTOMOBILE JOURNAL.

Irreversible Steering Gear—R. H. S., Cottonwood, Minn.
Will you please state through your Journal what is meant by the irreversible steering gear and how this device operates?

The principle involved in the construction does not vary greatly from that of the ordinary type, the difference being in the employment of a worm gear on the steering shaft, which engages with a toothed wheel to which the steering arm is attached. This type of mechanism is termed irreversible, as there can be no back action from the front wheel, which would require the driver to retain a firm grip on the steering wheel at all times. This device is of special convenience when driving over uneven highways, where there are stones and ruts, which tend to change the course of the vehicle. This type is used extensively on high-grade cars, as experts claim it ren-



Common Type of an Irreversible Steering Gear.

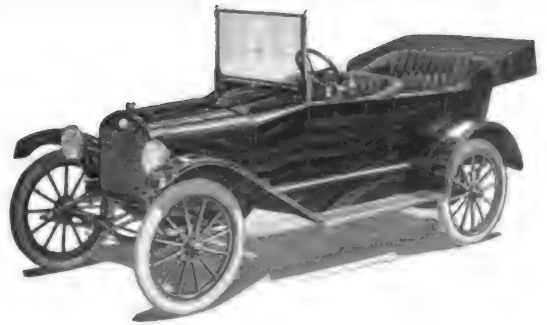
ders positive control with little effort. The accompanying illustration displays a type generally used.

RELINING CONE CLUTCH.

It is often found necessary, through misalignment or other faults, to reline the cone clutch. Some workmen insert new sections for worn portions, but this is seldom advisable except by proficient persons. Before placing a new leather on the cone it should be soaked in water over night. When applying to the clutch, however, it should not be stretched on, as the contraction of the material when drying will pull it out of the rivets.

After it has been attached, a large quantity of

(When Writing to Advertisers, Please Mention The Automobile Journal.)



METZ '25'

The Quality Car

\$600 Equipped Complete

INCLUDING Gray & Davis Electric Starter and Electric Lights, Instant One-Man Top, Built-in Rain Vision Wind Shield, Bosch High-Tension Magneto, Hyatt roller bearings, Speedometer, etc.

"Every Metz car sold sells another one." Write for Dealers' particulars and new catalog "Q."

METZ COMPANY, WALTHAM, MASS.

EISEMANN

The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.

The Eisemann Magneto Company

Sales and General Offices,
32-33d St., Brooklyn, N. Y.

New York, N. Y. Indianapolis, Ind. Detroit, Mich.
123 W. 52nd St. 415 N. Capitol Av. 802 Wd'v Av.



New Dover Galvanized Garage FUNNEL



The first practical large size (3gals.) Garage Funnel at a popular price

Send for 1914 Catalogue

DOVER STAMPING & MFG. CO

(3)

CAMBRIDGE, MASS.



is especially adapted to the lubrication of low priced cars because it provides a durable, pressure-resisting cushion between all contact surfaces, thereby reducing friction to a minimum and prolonging the life of the gears and bearings. NON-FLUID OIL has always been acknowledged the highest-grade lubricant for the highest-grade cars, but the reduced prices for 1915 now place it within the reach of all.



"K. No. 00 Special" grade for sliding gear transmission.

"K. No. 000" for differential, compression cups and all bearings. Avoid substitutes. Look for the orange-colored can bearing sprocket-wheel trade-mark shown above.

**New York & New Jersey
Lubricant Co.**

165 Broadway, New York

1430 Michigan Avenue, Chicago, Ill.

Write today for
our Territorial Agree-
ment on the New

\$1,000

**Inter-State
"FOUR"**

The ONE popular priced car with
the greatest selling arguments
in the country

INTER-STATE MOTOR CO.

804 W. Willard St.,
MUNCIE, IND.

Mea
MAGNETOS



**S. R. O.
BALL BEARINGS**



Sole Importers

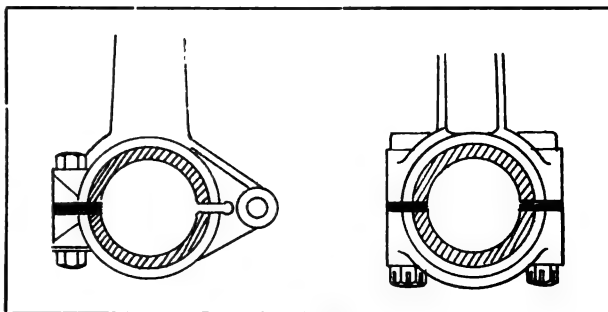
MARBURG BROS., 1790 Broadway, NEW YORK

(When Writing to Advertisers, Please Mention The Automobile Journal.)

castor oil should be smeared over the surface before using. It is also advisable, when using a new clutch leather for the first 100 miles, to keep the member well oiled. This allows the material to remain soft and pliable and to readily find a seat for its new work.

CONNECTING ROD BEARINGS.

As the connecting rod bearings, especially those at the crank end, are subject to wear, the motorist will at some time or other be called upon to make adjustment and often to insert a new rod. There are two different types of rods in use, being known as the hinged and marine. The former is at the left in the illustration and the latter at the right. The hinged type is the simpler in construction, as usually there is but one retaining nut holding the member to the crankshaft. The other end of the cap is held by a hinge, which permits the swinging of the member when removal is necessary. The marine type



Hinged (Left) and Marine (Right) Types of Connecting Rod Bearings.

employs bolts on either side of the bearing and in order to effect a removal it is necessary to entirely remove the cap. Both types are used extensively.

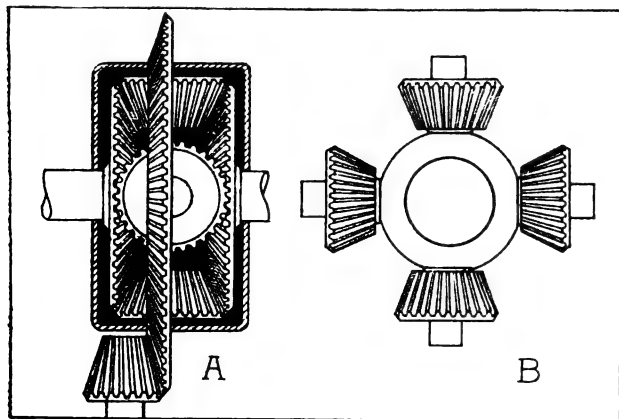
OPERATION OF THE DIFFERENTIAL.

It is probable that many of the recent purchasers of automobiles do not fully understand the working principle of a differential. It is comparatively simple.

Each axle is attached to a bevel gear, which, as can be seen in the accompanying illustration, are located in a drum or housing. On the outside of the housing is attached a large differential gear (see A), which meshes with a gear that is controlled by the drive shaft. This drum is split at its central point and shaped so as to receive what is usually termed a spider. This spider retains small pinion gears, which are free to rotate.

When all these members are assembled as a unit it is possible to turn one wheel in a forward direction and the other in the reverse. This is accomplished by the small pinions merely being turned upon their axes.

This can be demonstrated if one will place an ordinary lead pencil between the palms of the hands and then move them in opposite directions. It will be found that the lead pencil does not change its position, but simply revolves upon its own axis. When the car is running upon a smooth surface, where each wheel receives an equal amount of traction, the pinions are prevented from turning, they being carried around by the supporting pins and drum. When, however, the resistance is greater on one wheel than on the other, the drum will rotate forward with the wheel offering the least resistance, and the pinions will revolve upon their axes, running around



A, Construction of a Differential—B, Spider Retaining Small Pinion Gears.

the surface of the gear, which remains stationary.

It will be noted that the pinion can rotate independently of one bevel gear and act as a clutch of sufficient capacity on the other to carry it in the same direction as the differential drum is revolving.

TESTING WHEEL ALIGNMENT.

The economical operation of a truck depends to a certain extent on the alignment of the wheels. It is obvious that the degree of wear and the amount of power wasted, as well as the increased difficulty in steering, are proportionate to the inaccuracy of the wheels. An absolutely true alignment is almost an impossibility, but a near approximation must be obtained and retained if the tires are to give the desired service.

A simple and easily constructed device whereby one person may determine the align-

(When Writing to Advertisers Please Mention The Automobile Journal.)

Put a Punch in Your Motor



WITH

LEAK-PROOF PISTON RINGS

MADE BY MCQUAY-NORRIS MFG. CO., ST. LOUIS, U. S. A.

THEY secure perfect compression of each fuel charge and the utilization of the whole force of the succeeding power impulse. They also prevent impairment of valve action by carbon caused by surplus lubricating oil getting up past worn or imperfect piston rings into the combustion chamber of the cylinder.



The patented two-piece, angle-to-angle interlocking construction is the exclusive **LEAK-PROOF** design—absolutely essential to true **LEAK-PROOF** service. It is the only mechanical principle by which exact fit, equal and enduring tension of a piston ring can be obtained. Look for this feature—identify the **LEAK-PROOF** Ring—insist on it when you order.

Sold by all up-to-date supply houses, garages and repair shops.

MCQUAY-NORRIS MFG. CO., Dept. D. ST. LOUIS, U. S. A.

Canadian Factory:

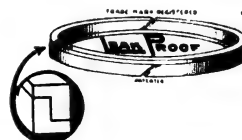
W. H. BANFIELD & SONS, 120 Adelaide St., West, TORONTO

BRANCH OFFICES:

NEW YORK—1919-29 Broadway at 64th Street
PITTSBURGH—902 Second National Bank Building
KANSAS CITY—513 New Nelson Building
CHICAGO—Suite 718 Michigan Boulevard Building
SAN FRANCISCO—64 Hansford Building
LOS ANGELES—224 Central Building
DALLAS—509 Juanita Building
ST. PAUL—American National Bank Building

Ask the User

In use on
over
300,000
motors



FREE BOOK
"To Have
and to Hold
Power"

Send for it
to-day

Straight Trade Advertising

A trade directory has features that commend it, but the Accessory and Garage Journal is more efficient in service. It reaches every manufacturer, sales agent, jobbing house, agent, representative, dealer and sales force 12 times a year, and is read each month by several, sometimes many, with each concern. Copy can be changed each month—trade directories are issued annually or quarterly.

The monthly circulation means eight times more distribution and if each copy is read by three persons—a low estimate—the aggregate is 24 times the total for the directory. But the trade directory is not read with care—it is referred to occasionally and the number of readers is not dependable. In this publication we give you free the best trade directory service known and the circulation of 20,000 a month is guaranteed.

Compare the service and cost of the Accessory and Garage Journal with any other form of trade publicity—then back this with our absolute guarantee as to what we accord advertisers in this magazine, the only straight Automobile Trade Paper published.

All Garages.

All Repair Shops.

All Ford Dealers.

All Dealers in Vehicles.

All Dealers in Supplies, Fittings and Accessories.

All Jobbers in Supplies, Fittings and Accessories.

All Pleasure and Commercial Vehicle Makers.

All Manufacturers in the Automobile and Allied Industries.

WRITE FOR PROOF

Accessory and Garage Journal

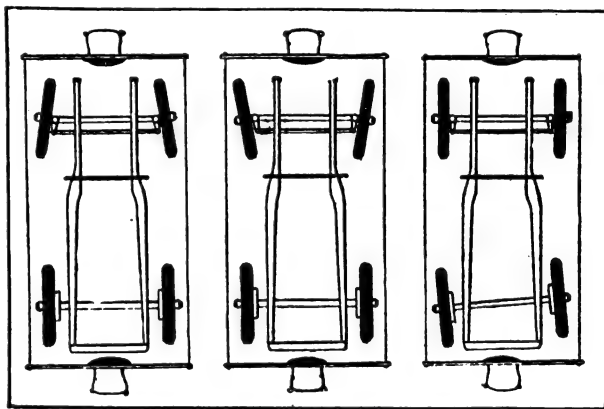
Times Building,

Pawtucket, R. I.

(When Writing to Advertisers Please Mention The Automobile Journal.)

ment can be made of two strips of wood which are about seven or eight feet long. After ascertaining the centre point of each piece a hole should be drilled in the ends of each strip at exactly the same distance from the centre line. Next join the two pieces by lengths of heavy cord, each about 15 feet long. The strips of wood should be placed across rests at the front and rear of the car and adjusted so that one of the cords is exactly parallel with one of the rear wheels.

To determine this the distance between the string and the rim at opposite points should be measured—never measure to the tire, which varies at different points. If the other rear wheel should not be parallel with the other string it is probable that the rear axle may be bent, the wheel out of true, or the axle may have shifted along the spring. If the car is of the chain driven type it is possible that the chain tension



Home Made Aligning Device, Illustration Showing How Wheels May Be Out of Alignment.

may have been unequally adjusted and one radius rod is longer than the other.

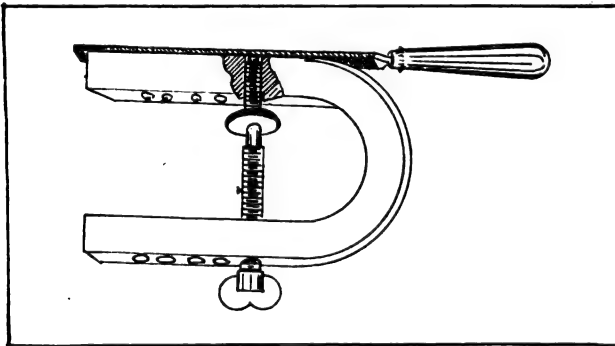
To test the front steering wheels they should be set parallel with the string, which should be in alignment with the rear wheels. As wheel rims may vary at different points, it is advisable to give each wheel a quarter turn and then repeat the measurement. The method is illustrated herewith.

JIG FOR CONTACT SCREW.

When the contact points of the coil vibrator become pitted, or burned, the motor action is very irregular, and it is then necessary to file the platinum tips. It is necessary to exercise considerable care in the operation, as the faces must be true. If the points should be smoothed off on a slight angle, the entire area of the platinum

would not be available for contact purposes. While a temporary improvement may be effected, yet the current will soon burn the metal, owing to the insufficient contact area.

A simple fitting, or jig, for trueing up the platinum tips of contact screws is illustrated. This device consists of a "U" shaped bar of steel about one-half inch in diameter, in which several holes have been drilled. The top part of the bar should be perforated by holes of different diameters to receive the various sizes of vibrator contact screws used in standard coils. Directly under these there should be another series of holes, which should be tapped to receive a quarter-inch bolt. The upper surface of the device should then be machined absolutely smooth, after which it can be hardened. In application, the contact screws is inserted in the hole which corresponds to its diameter and then the bolt is screwed up against the head of the contact



Easily Constructed Device for Smoothing Platinum Points.

screw until the platinum point appears a little above the top plate of the jig. A fine file is then passed over the surface of the screw until the platinum is smooth. The hardened surface of the jig acts as a guide for the file and insures a true surface for the contact point.

REMOVING CARBON.

The best methods of removing carbon from the cylinders is to scrape it out or burn it by the use of oxygen. Such cleaning may be necessary when the time required for either process cannot be allowed. In such an event the carbon can be effectively removed by this process: Start the motor until it reaches a normal heat. The spark plugs should then be removed and an equal portion of a 10-cent cake of common gum camphor dropped into each cylinder. The motor should then be started and the carbon will be forced out through the exhaust.

When Writing to Advertisers, Please Mention The Automobile Journal.

HEINZE

High Tension MAGNETO



HEINZE ELECTRIC COMPANY

Make Heinze the Better Magneto

FACTORIES
Lowell,
Mass.

BRANCH OFFICES
New York
Detroit

Better Material
Better Work-
manship

Better Manu-
facturing
facilities

SALES OFFICES
Detroit
Mich.

BRANCH OFFICES
Chicago
Minneapolis

20,000 GUARANTEED

When you have anything to say to those in the automobile industry use straight trade talk copy in the

Accessory and Garage Journal

The only strictly automobile trade paper published in America

Automobile Journal Publishing Co.

Publishers

AUTOMOBILE JOURNAL **MOTOR TRUCK**
Times Building, Pawtucket, R. I.

Thermoid HYDRAULIC COMPRESSED Brake Lining-100%

THERMOID RUBBER CO., TRENTON, N. J.

The Easiest Riding
Car in the
World

MARMON

F. E. WING
562 Commonwealth Ave.
BOSTON, MASS.

New England Dealer for

NORDYKE & MARMON CO., Indianapolis, Ind.

MARMON "41"
\$3250

132" Wheelbase

MARMON "48"
\$5000

145" Wheelbase

THE MOTOR TRUCK

A Recognized Authority in the
Commercial Vehicle Field

12 ISSUES

\$2.00 THE YEAR

The A. J. Automobile Library

(Including All of the Famous A. B. C. Books)

A Complete Library of
Automobile Mechanics **\$4.75**

Transportation Charges Prepaid

Distinct Books—1000 Pages of Text—All Copies Indexed—2000 Illustrations,
Including Practical Working Page Charts and Trouble Finders.

Books written by recognized authorities. Especially prepared for those
who have to do with the sale, care, repair and operation of motor vehicles,
their parts, equipment, accessories, etc.

The practical information in these works cannot be secured through any other
series or number of books or for 50 times what is charged for this library.



Engine . . .	35c	Chassis . . .	25c
Magneto . . .	35c	Lighting . . .	50c
Carburetor . . .	35c	Operation . . .	50c
Battery . . .	35c	Overhauling . . .	50c
Tires . . .	25c	Motorcycle . . .	35c

Truck Operation \$1.00

Automobile Journal Publishing Company

Times Building

Pawtucket, R. I.

ZENITH

SIMPLICITY



THE strongest appeal of the Zenith lies in its absence of moving parts and adjustments. Once properly installed the car owner forgets he has such a device on his machine.

Because right down to elementals—to the very bed rock of carburetion—goes the Zenith. Outside of the constant level mechanism and of the butterfly valve all else is rigid and proof against carburetor ills.

This extreme simplicity means permanent carburetion satisfaction. Where you have a multiplicity of adjustments which can be thrown out of order by the inquisitive novice—you have trouble. Where there are springs or valves or pistons to eventually fail in their proper workings you will surely get variable mixtures—and trouble. Complication is expensive to maintain. Why use it when it is unnecessary?

The secret of the Zenith lies in its fundamental principle in the Compound Nozzle. In this exclusive and basic idea can be found the many reasons for Zenith simplicity and superiority and remarkable results. Without it, complication piles up or results are lacking. With it, the perfect mixture balance is constantly maintained. The record of the Zenith through seven years of ascending popularity proves its worth.

Repeat orders year after year tell the Zenith story. Holding old customers and making new friends in an ever widening circle drives home this fact. The simplicity of the Zenith principle is exclusive and fully protected. It is always at your service.

CARBURETOR

DETROIT • U - S - A •

"Just Like a Mirror!"



JOHNSON'S PREPARED WAX

is the standard polish for body, hood and fenders. It is quite different from the many liquid polishes on the market—most of which contain acid or oil, and if they do not actually injure the finish—at least remain on the surface sticky and tacky—gathering every bit of dust.

Johnson's Prepared Wax is not a new product—it has been on the market for twenty-five years. It is used every day in thousands of homes for polishing pianos, fine furniture, woodwork and floors. Our cherished reputation stands back of Johnson's Prepared Wax.

Johnson's Prepared Wax cleans, polishes and finishes in one operation. It preserves the varnish and protects it from the weather. It is in paste form—clean and easy to use and economical.

1 pint by Parcel Post 60c—enough for a season's use.

I enclose 10c for a can of Johnson's Prepared Wax—sufficient for one coat on a large car.

Name.....

Address.....

City & State

My Accessory Dealer is.....AJ

Does Not Gather Dust

Johnson's Prepared Wax gives a perfectly hard, dry, glasslike finish that cannot collect dust. It forms a thin, protecting film over the varnish—prevents checking and cracking and

"Sheds Water Like a Duck's Back"

It keeps new cars bright and good looking for an indefinite time—and will make old cars look as well as a coat of paint and varnish. Mud spots can be easily and entirely removed from cars which have been polished with Johnson's Prepared Wax. It imparts a velvety, protecting finish of great beauty and durability. It is impervious to dust, water, scratches, finger prints, etc.

Send us the attached coupon together with 10c and we will forward post-paid a can of Johnson's Prepared Wax—sufficient for one application on a large car.

Agents wanted to sell
Johnson's Prepared Wax.

S. C. JOHNSON & SON
"The Wood Finishing Authorities"
RACINE, WIS.



VOL. XXXIX.

NO. 10.

AUTOMOBILE JOURNAL

\$1.50 the year
10 cents the copy

PAWTUCKET R.I.

June 25, 1915

Notice of Increase in Guaranteed Mileage to 6,000 Miles

HEREAFTER 6,000 miles will be the basis of guaranteed service for all Pennsylvania Oilproof

VACUUM CUP TIRES

—per guarantee tag attached to each casing.

This will also apply to all Vacuum Cup Tires at present in service.

This announcement follows logically the result of The Automobile Club of America Official Test, in which nine tires, on heavy cars averaged 6,760 miles, three of them exceeding 8,900 miles.

On the new basis of guarantee, Vacuum Cup Tires are lower in cost per mile by from 17% to 22% than any so-called non-skid tires sold on an adjustment basis of 3,500 miles.

The dealer's positive assurance of profitable sales is a natural evolution of the consumer's positive assurance of definite average mileage performance.

Pennsylvania Rubber Company, Jeannette, Pa.

*Direct factory branches and service agencies
throughout the United States and Canada*

An Independent Company with an Independent Selling Policy



A ROUTE GUIDE, LOG, MAP and TOURING BOOK

The Greatest Touring Book of the Greatest Touring Year—An All-America Number

A Nation's Touring Information Crystallized
in One Edition of an Owner's Magazine

A Yearly Buyers' Guide and Reference Directory

NINTH ANNUAL TOURING NUMBER

OF THE

AUTOMOBILE JOURNAL

1915 EDITION—30,000 COPIES

To Issue July 10

Price 10 cents.

**Purchased by Motorists the Country
Over and Used Everywhere**

Absolutely unique with motoring publications, this edition will afford to advertisers an unparalleled opportunity to reach motor car owners who will plan their tours and buy their equipment for the season's use.

**GIVING TO ADVERTISERS IMME-
DIATE AND LASTING RETURNS**

For further facts and rates, write

Automobile Journal Publishing Company

TIMES BUILDING

PAWTUCKET, R. I.

The Gentle Touch of a Giant Finger

A good, lively spring in effect tries to shoot you out of the car as a bow shoots an arrow. That's the way a spring works. Now imagine a giant finger pressing its cushioned tip gently on the spring and easing it back as you would ease back a taut bow. No recoil—no jar—but just a *lengthening* of the motion.

That is the way the new, Automatic Hartford Shock Absorber works. It reduces car

Automobile Manufacturers are now using the finest springs that can be made. If you want more comfort, you must use Hartford Shock Absorbers.

★Hartford
SHOCK ABSORBER

Soothes the Angry Spring

motion to long, undulating waves—even on rough, country roads. The Hartford controls and equalizes spring action.

The Hartford is automatic in that it works progressively. For normal movements the springs are entirely free of control. When the spring action goes beyond normal the control is applied and increases automatically as the action increases. This is accomplished by a multiple disc construction, these discs engaging progressively.

Let us send you a book which discusses the whole question of shock absorbing. It will tell you why the Hartford is standard equipment on so many prominent cars and why 95% of the racing drivers use it. You will not know the ultimate of car comfort until you ride on springs controlled by Hartford Shock Absorbers.

Hartford Suspension Company

E. V. HARTFORD, Pres.

147 Morgan Street

Jersey City, N. J.

BRANCHES:

New York
Chicago

Newark
Philadelphia
Kansas City

Boston
Pittsburgh
Indianapolis

*Formerly Truffault-Hartford

Makes Every Road a Boulevard

(When Writing to Advertisers, Please Mention The Automobile Journal.)

COE'S WRENCHES



UNEQUALLED FOR QUALITY THE WORLD OVER

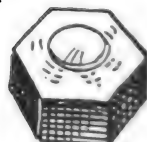
The wrench is the most used and the most useful tool in a motorist's kit.

COE'S Special Automobile Model is a perfect tool. The jaws are hardened special quality tool steel to withstand hard usage, and the handle is long to afford great leverage. The wrench is thin to work in space inaccessible for ordinary wrenches.

Coe's Special Automobile Model wrench is a tool kit in itself. Coe's quality costs slightly more, and it is worth many times the price of any other tool. A Coe's is always dependable, in the garage or on the road. Literature sent at request.

COE'S WRENCH COMPANY WORCESTER, MASS.

Distributors: { J. C. McCarty & Co., 21 Murray Street,
John H. Graham & Co., 113 Chambers Street, } New York City



(When Writing to Advertisers Please Mention The Automobile Journal.)

FACT No. 1

The best estimate of number of owners of motor vehicles in the United States is 2,360,000.

These are served by approximately 40,000 industrial and trade interests—those who buy and sell.

Any publication of national distribution devoted to motoring, to the owner, the industry and the trade, with maximum circulation of from 20,000 to 25,000, can reach but a few of any of these classifications in any given section of the country.

Every man engaged in industry or trade directs his endeavors to developing what is the most productive market—in those localities where it can be best promoted and stimulated, and where the returns will be assured. He concentrates his energies because he knows that scatteration is non-productive. He wants an enduring market.

There is no reason why a business man should not concentrate his advertising and promotion where it will be equally productive and certain of production.

The AUTOMOBILE JOURNAL has a distribution of 20,000 in a definite section of the country and to owners. It affords a service that is 100 per cent. in quality and quantity, that has a productiveness for advertising and promotion that cannot be approached, and in the greatest motor vehicle and accessory market of the world.

CONCENTRATION is everything to the advertiser who wants results and a lasting market.

Other Facts at Request.

The Automobile Journal Publishing Company
TIMES BUILDING PAWTUCKET, R. I.

NEW YORK

CHICAGO

BOSTON

DETROIT.

Subscriptions:

The United States and Mexico,
\$1.50 a year; Canada and For-
eign Countries in Postal
Union, \$2.00 a year.
Ten cents a copy.

THE AUTOMOBILE JOURNAL

Remittances:

Should be made by Check, Draft,
Postoffice or Express Money
Order, or Registered Letter.
Money enclosures must
be at sender's risk.

William H. Black, Treasurer.

AUTOMOBILE JOURNAL PUB. CO.

Published the 10th and
25th of Each Month.

D. O. Black, Jr., Secretary.

Times Building, Pawtucket, R. I.

Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under Act of Congress of March 3, 1879.

VOL. XXXIX.

JUNE 25, 1915.

NO. 10.

PUBLISHER'S AND READERS' PAGE.

THE Automobile Journal Has Been Selected among all other motor journals of the country as the official organ of the Touring Information Bureau of America, and the first tour, describing by maps and text a trip through the Mojave desert, is presented in this issue. Similar especially prepared articles will be presented in succeeding issues. In addition to this arrangement, the subscribers to The Automobile Journal will be able to secure free of cost any special touring information relating to any section of the country they may desire by writing to the bureau at its Kansas City offices in Missouri. The foundation of these articles is to be found in the "TIB Automobile Route Book," published by the Touring Information Bureau, and containing a vast amount of touring data, covering all parts of the country, and so arranged as to be included in one convenient volume. Its strip maps, three of which are published in this issue, are exclusive features of the book. As will be noted, they convey the most minute essential detail regarding a tour—places where supplies, lodging, meals, etc., can be obtained. Readers are urged to investigate this service, and their inquiries will receive prompt attention from the Touring Information Bureau.

The Ninth Annual Touring Number of The Automobile Journal is the title of the next issue. As the title suggests, it will be a complete index of tours and will contain a greatly increased number of pages over the usual edition. There will be several hundred illustrations from original photographs that visualize every section of the United States and Canada and show the tourist, as nothing else can, what he may expect to find along the particular route he chooses to follow. The tables of tours accompanying every article are absolutely authentic and afford a schedule of distances, etc., upon which the tourist can rely with confidence in their accuracy. Each routing is indexed and cross-indexed, as are the maps, principal vacation spots, night stops and chief centres throughout the country, in a form that sup-

plies ready reference for the reader. The maps are unusually distinct and inclusive.

The Buyers' Reference and Guide is not merely an index of manufacturers, but is also a home market place for car owners and operators. Anyone who wishes to purchase any article pertaining to automobiles and trucks can do no better than to study the names presented in the Buyers' Guide and to correspond with the manufacturers of the particular article he desires. The firms are all representative and responsible and are in a position to offer exceptional bargains to readers of this magazine. When writing, the inquirer will confer a favor upon the publisher by mentioning this journal as the place where the manufacturer's name was obtained.

How to Obtain More Mileage from tires is a subject that means actual money to the car owner. This issue presents the first installment of a series which describes the common troubles of tires and their causes and suggestions as to their avoidance. It appears in the New Owners' Department, in which in succeeding issues will be presented other similar subjects of much educational value. The Correspondence editor is pleased to note a steady increase in the number of inquiries addressed to this department, and as far as possible he will include every letter received in the issue immediately following. At this season of the year, more than at any other time, the suggestions as to repairs, maintenance and operation contained in this department are very valuable to the owner and operator. Above all things they are practical and

Partial Table of Contents.

	Page
*Motoring Across the Mojave Desert....	11
*Great Race Certain at Chicago.....	17
*General News of the Industry.....	21
*High-Gear Hill Climbing with Cole Eight.....	25
*Studying Traffic Systems.....	26
Jitneys Struggle Against Odds.....	27
*Cruise Meeting of the S. A. E.....	29
*Great Progress at Sheepshead Bay.....	31
New Laws and Court Rulings.....	32
*Truck Efficiency in Road Building.....	33
*Practical Motor Car Repairs.....	35
*French Motor Sterilizing Plant.....	39
*Car Accessories and Equipment.....	41
*To the Pacific in a Packard.....	45
*Monarch Eight Production Begun.....	49
*Industrial Happenings and Comment....	53
*New Marmon Series Announced.....	55
*Suggestions for the Ford Car Owners....	59
*Practical Facts for New Car Owners....	66

*Indicates article is illustrated.

economical.

As An Owners' Magazine The Automobile Journal is second to none in this country. In addition to keeping its readers advised of all developments in the motor vehicle industry and kindred lines, it specializes in one of its departments on the Ford automobile. The accessories described are recognized as the best.



For Your Aeroplane, Automobile or Motor Boat

UP in the air, on the road or on the water,
Texaco Motor Oil means maximum
power from a quiet, easy running motor.

Texaco Motor Oil never deposits a hard
carbon crust. It lubricates perfectly at all times
on account of a zero cold test.

If you are not already using it, try it. *It
will reduce your gasoline consumption any-
where from ten to twenty per cent.*

In 1 and 5 gallon cans at good garages
everywhere.

Write today for *Motor Miles*, our free
booklet, of interest to every motorist.

THE TEXAS COMPANY
New York

TEXACO MOTOR OIL

(When Writing to Advertisers Please Mention The Automobile Journal.)

Buyers' Reference and Guide.

ACCESSORY MANUFACTURERS AND JOBBERS.

Alsten & Goulding Co., Worcester, Mass.
Auto Parts Co., Providence, R. I.
Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.
Times Square Auto Co., 56th St., at Broadway, New York City.

AIR COMPRESSORS AND TANKS.

Brunner Mfg. Co., Main Office and Factory, Utica, N. Y.; New York Office, Hudson Terminal Bldg., 30 Church St. (Brunner.)

Williams Foundry & Machine Co., Akron, O.

AIR PUMPS.

Gardiner Governor Co., 126 Williamson St., Quincy, Ill.
Lipman Air Appliance Co., 199 Pleasant St., Beloit, Wis. (Portable, Stationary.)

ANTI-RATTLERS.

King Specialty Mfg. Co., Brookline, Mass.

ANTISEPTIC RESPIRATORS.

O-Zel-O Company, Dept. A 54, Fort Wayne, Ind.

ARBOR PRESSES.

Bartlett, Edwin E., 322 A St., Boston. (Greenerd.)

AUTOMOBILE ACCESSORIES.

Gemco Mfg. Co., 743 So. Pierce St., Milwaukee, Wis.

AUTOMOBILE PARTS.

Gemco Mfg. Co., 743 So. Pierce St., Milwaukee, Wis.

AUTOMOBILES. (See Cars.)

AUTOMOBILE SPECIALTIES.

Motor Specialties Co., Waltham, Mass.

BALLS AND BALL BEARINGS.

Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1790 Broadway, New York City; 805 Woodward Ave., Detroit.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (R. I. V.)

Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)

New Departure Mfg. Co., Bristol, Conn. (New Departure.)

Norma Co. of America, 1790 Broadway, New York City. (Norma.)

BEARING METALS.

Bunting Bronze and Brass Co., 727 Spencer St., Toledo, O. (Bunting.)

BODIES—WOOD AND METAL.

Cotton, Inc., L. M., Boston, Mass.

Highland Body Mfg. Co., Cincinnati, O. (Highland.)

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

BRAKE BANDING OR LINING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Multibestos.)

Royal Equipment Co., 1378 Bostwick Ave., Bridgeport, Conn. (Raybestos.)

Standard Woven Fabric Co., Framingham, Mass. (Multibestos.)

Staybestos Mfg. Co., Lena and Armat Sts., Germantown, Philadelphia, Penn. (Staybestos.)

Thermold Rubber Co., Trenton, N. J.

BRUSHES, WIRE.

Williams Foundry & Machine Co., Akron, O.

CABLE, AUTOMOBILE.

Packard Electric Co., The, Warren, O.

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARBURETORS.

Air-Friction Carburetor Co., Dayton, O. (Model C.)

Zenith Carburetor Co., Detroit. (Zenith.)

CARS—GASOLINE PLEASURE.

Inter-State Motor Co., 804 West Willard St., Muncie, Ind. (Inter-State.)

Metz Co., Waltham, Mass. (Metz.)

Nordyke & Marmon Co., Indianapolis. (Marmon.)

Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Scripps-Booth Co., Detroit. (Scripps-Booth.)

Stutz Motor Car Co., Indianapolis. (Stutz.)

White Co., Cleveland, O. (White.)

Willys-Overland Co., Toledo, O. (Overland.)

Winton Motor Car Co., 131 Berea Road, Cleveland, O. (Winton.)

CARS—GASOLINE COMMERCIAL.

Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)

Chase Motor Truck Co., 106 West St., Syracuse, N. Y.

Duplex Power Car Co., Charlotte, Mich. (Duplex.)

Federal Motor Truck Co., Junction and Leavitt Sts., Detroit. (Federal.)

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

Independent Motors Co., Port Huron, Mich. (Independent.)

Jeffery Co., Thos. B., Kenosha, Wis.

Louth-Juergens Motor Car Co., Fremont, O. (Fremont Mals.)

Packard Motor Car Co., Detroit, Mich.

Peerless Motor Car Co., Cleveland, O. (Peerless.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Sanford Motor Truck Co., Syracuse, N. Y. (Sanford.)

Signal Motor Truck Co., Detroit. (Signal.)

Sullivan Motor Car Co., Rochester, N. Y. (Sullivan.)

White Co., Cleveland, O. (White.)

CARS—ELECTRIC COMMERCIAL.

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

General Vehicle Co., Long Island, N. Y.

CHAIN LUBRICANTS.

Motor Accessories Inc., 749 A Boylston St., Boston. (Chain-Lub.)

CHAINS, TIRE AND ANTI-SKIDING DEVICES.

Weed Chain Tire Grip Co., 28 Moore St., New York. (Weed.)

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

CIGAR LIGHTERS. (See Lighters.)

COILS.

Heinze Electric Co., Lowell, Mass.

CONTROLLERS.

Pierce Speed Controller Co., Anderson, Ind.

CRANK HOLDERS.

King Specialty Co., Brookline, Mass. (King.)

CYLINDER CLEANING COMPOUND.
Dyer Apparatus Co., Cambridge, Mass. (Oxy-Carbon.)

ELECTRIC LIGHTING EQUIPMENT.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FAN BELTS.

Housel Sales Co., B Street, Buffalo, N. Y.

FIRE EXTINGUISHERS.

Pyrene Co. of N. E., 38 Broad St., Boston.

FORD GASOLINE GAUGES.

Housel Sales Co., B Street, Buffalo, N. Y.

FORD HOODS AND RADIATORS.

Superior Lamp Mfg. Co., 136 W. 52nd St., New York, N. Y.

FORD STARTERS.

Hunter Auto Supply Co., Hunter Bldg., 333 W. Madison St., Chicago, Ill. (Hunter.)

Walden Mfg. Co., 73 Commercial St., Worcester, Mass.

FUNNELS, AUTO.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GEARLESS DIFFERENTIALS.

Gearless Differential Co., 864 Woodward Ave., Detroit, Mich.

GEAR SETS.

Detroit Radiator Spec. Co., 961 Woodward Ave., Detroit, Mich.

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind. (Ross.)

GENERATORS.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

HEADLIGHT DIMMERS.

Chaney Co., L. F., Springfield, O. (Chaney.)

HEATERS.

Superior Mfg. Co., N. S. Pittsburg, Penn. (Superior Safe Garage.)

HORNS.

Fitzgerald Mfg. Co., 101 Oliver St., Torrington, Conn. (Clero.)

Garford Mfg. Co., Elyria, O. (Tuto.)

Lovell-McConnell Mfg. Co., Newark, N. J. (Klaxon.)

Selss Mfg. Co., 444 Dorr St., Toledo, O.

INSULATION.

Packard Electric Co., The, Warren, O.

JACKS.

Motor Specialties Co., Waltham, Mass. (Excel Auto.)

LAMPS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric Trouble.)

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Clamp.)

LIGHTERS, CIGAR.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)

THE AUTOMOBILE JOURNAL.

BUYERS' REFERENCE and GUIDE—Continued.

LIGHTING SYSTEMS, ELECTRIC.

Carleton Co., The, 172 Summer St., Boston. (New Carleton No. 68.)

Garford Mfg. Co., Elyria, O. (Dynalux.)

Hawthorne Mfg. Co., Inc., 5 Spruce St., Philadelphia, Penn. (Spotlights, Marine Searchlights, Pencil Flashlights.)

Malton Specialty Co., 775 Boylston St., Boston, Mass.

Motor Parts Co., 818 No. Broad St., Philadelphia, Penn.

LUBRICANTS.

Alsten & Goulding Co., Worcester, Mass. (Aiding.)

Continental Asbestos Corp., Worcester, Mass. (Spedolene.)

Dixon Crucible Co., Jos., Jersey City, N. J. (Graphita.)

Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagleine No-Karbon.)

Harris Oil Co., A. W., 326 So. Water St., Providence, R. I.; 143 No. Wabash Ave., Chicago. (Harris.)

New York Lubricating Oil Co., 116 Broad St., New York City. (Monogram.)

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MotoRol, Non-Fluid, Kejex.)

Standard Oil Co., New York. (Polarine.)

Texas Company, 17 Battery place, New York City. (Texaco.)

Vacuum Oil Co., Rochester, N. Y. (Gargoyle Mobiloil.)

Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETO COVERS.

Heinze Electric Co., Lowell, Mass.

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.

Eisemann Magneto Co., 32 33d St., Brooklyn, N. Y. (Eisemann.)

Marburg Bros., 1790 Broadway, New York. (Mea.)

Motor Parts Co., 818 No. Broad St., Philadelphia, Penn.

Spltdorf Electrical Co., 98 Warren St., Newark, N. J.

MAILING LIST.

Trade Circular Addressing Co., 166 W. Adams St., Chicago.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

MOTORS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Michigan.)

Wisconsin Motor Mfg. Co., Milwaukee, Wis.

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

PRESSES. (See Arbor Presses.)

PUMPS, TIRE.

Kellogg Mfg. Co., Rochester, N. Y. (Kellogg.)

PUMPS, VALVE.

Hill Pump Valve Co., Chicago, Ill.

RADIATOR CEMENT. (See Cements.)

RADIATOR & HOOD COMBINATIONS.

Superior Lamp Mfg. Co., 136 W. 52nd St., New York, N. Y.

REAMERS.

Harding Distributing Co., Boston. (Martell Alligning.)

REAR APRONS FOR FORDS. Housel Sales Co., B Street, Buffalo, N. Y. (Gibmill.)

RINGS. (See Piston Rings.)

ROAD BUILDING MATERIALS.

Barrett Manufacturing Co., New York. (Tarvia.)

ROLLER BEARINGS.

Hyatt Roller Bearing Co., Detroit. (Hyatt.)

Norma Co. of America, 1790 Broadway, New York City. (Norma.)

SEATS.

Auto Parts Co., Dept. T, 737-739 W. Jackson Blvd., Chicago, Ill. (Racing.)

SELF-STARTERS. (See Motor Starters.)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Sager Peerless.)

Hartford Suspension Co., 147 Morgan St., Jersey City, N. J.

SPARK PLUGS AND IGNITERS.

Alsten & Goulding Co., Worcester, Mass. (Aiding.)

Bosch Magneto Co., 223-225 W. 46th St., New York.

Gibson-Hollister Mfg. Co., Boston, Mass.

Heinze Electric Co., Lowell, Mass.

Milwaukee Auto Specialty Co., 705-711 Chestnut St., Milwaukee, Wis. (Centerfire.)

Spltdorf Electrical Co., 98 Warren St., Newark, N. J.

Stonebridge Sales Co., 10 Wall St., New York, N. Y.

SPRING OILERS.

Housel Sales Co., B Street, Buffalo, N. Y.

SPRINGS FOR AUTOMOBILE SUSPENSION.

Marburg Bros., Inc., 1790 Broadway, New York. (Marburg-Hagen.)

Tuthill Spring Co., 756 Polk St., Chicago. (Titanic Unbreakable.)

SPROCKETS.

Boyd, F. Shirley, 175 Massachusetts Ave., Boston. (Baldwin.)

STARTERS.

Motor Parts Co., 818 No. Broad St., Philadelphia, Penn.

Mueller & Co., R. S., 431 High Ave., S. E., Cleveland, O. (Universal.)

THERMOS CASES.

Dover Stamping & Manufacturing Co., Cambridge, Mass.

TIMERS.

Motor Specialties Co., Waltham, Mass. (Bemus.)

TIME STAMPS.

Hoggson & Co., S. H., Thames Bldg., New York, N. Y.

TIRE CHAIN GRIPS. (See Chains.)

TIRES, CASINGS AND INNER TUBES.

Federal Rubber Mfg. Co., Milwaukee, Wis. (Federal.)

Goodyear Tire & Rubber Co., Madison St., Akron, O.

Miller Rubber Co., Akron, O. (Miller.)

Polack Tyre & Rubber Co., 246 W. 59th St., New York City. (Polack.)

TIRE TOOLS.

Housel Sales Co., B Street, Buffalo, N. Y.

TOPS AND ATTACHMENTS.

Highland Body Manufacturing Co., Station P, Cincinnati, O. (Highland Coupe.)

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

TRANSFORMERS.

Packard Electric Co., The, Warren, O.

TRUCKS AND TRACTORS. (See Cars, Commercial.)

UNLOADERS.

Gallon Iron Works and Mfg. Co., 116 East Main St., Gallon, O. (Gallon Eclipse Portable.)

VALVE LIFTERS AND RESEATERS.

Paro, H. G., Suite 718-719 Michigan Blvd., Bldg., 30 No. Michigan Blvd., Chicago.

VALVE TOOLS.

American Valve Tool Co., 589 Hudson St., New York, N. Y.

VIBRATORS.

J & B Mfg. Co., Pittsfield, Mass.

VULCANIZERS.

Mabey's Electric & Mfg. Co., Indianapolis. (Mabey's Electric.)

Vanderpool Co., Springfield, O.

Williams Foundry & Machine Co., Akron, O.

WARNING SIGNALS.

Seiss Mfg. Co., 444 Dorr St., Toledo, O.

WELDING OUTFITS.

Dyer Apparatus Co., Cambridge, Mass. (Dyer.)

Searchlight Co., 1012 Karpen Bldg., Chicago, Ill.

Waterhouse Welding Co., 3 Pelham St., Boston, Mass.

WHEELS, WIRE.

Houk Mfg. Co., 1709 Elmwood Ave., Buffalo, N. Y. (Houk Detachable.)

WRENCHES AND COMBINATION OUTFITS.

Coes Wrench Co., Worcester, Mass.

Lane, Will B., 180 No. Dearborn St., Chicago. (Unique Ratchet.)

Mossberg Co., Frank, Attleboro, Mass.

Walden Mfg. Co., 73 Commercial St., Worcester, Mass.

Index to Advertisers.

	Page
Ahlberg Bearing Co.....	72
Alsten & Goulding Co.....	72
Barrett Manufacturing Co.....	74
Bosch Magneto Co.....	73
Boyd, F. Shirley.....	68
Coes Wrench Co.....	2
Continental Asbestog Corp.....	70
Culver Stearns Mfg. Co.....	70
Dixon Crucible Co., Jos.....	74
Dover Stamping & Mfg. Co.....	79
Eagle Oil & Supply Co.....	8
Eisemann Magneto Co.....	79
Garford Mfg. Co.....	74
Goodyear Tire & Rubber Co.....	73
Harris Oil Co., A. W.....	74
Hartford Suspension Co.....	1
Heinze Electric Co.....	78
Hotel Longacre.....	68
Hotel New Amsterdam.....	71
Hotel Tuller.....	70
Inter-State Motor Co.....	76
Johnson, S. C. & Son.....	67
Longacre Hotel.....	68
Marburg Bros.....	76
McQuay-Norris Mfg. Co.....	68
Mea Magneto Co.....	76
Mecca Mfg. & Spec. Co.....	8
Metz Company.....	79
Miller Rubber Co.....	77
Mossberg Co., Frank.....	61
Motor Parts Co.....	70
New Amsterdam Hotel.....	71
New Departure Mfg. Co.....	78
Nordyke & Marmon.....	78
N. Y. & N. J. Lubricant Co.....	76
O-Zel-O Co., The.....	73
Peerless Motor Car Co.....	70
Pennsylvania Rubber Co.....	Cover
Pierce Arrow M. C. Co.....	Cover
R. & H. Co.....	78
Royal Equipment Co.....	71
Scripps-Booth Co., The.....	69
Seiss Mfg. Co.....	71
Splitdorf Electrical Co.....	72
Springfield Metal Body Co.....	9
Standard Oil Co.....	75
Standard Woven Fabric Co.....	Cover
Staybestos Mfg. Co., The.....	68
Stevens & Co.....	74
Superior Mfg. Co.....	68
Tankil Chemical Sales Co.....	71
Texas Co., The.....	5
Thermoid Rubber Co.....	78
Times Square Automobile Co.....	8
Tuller Hotel.....	70
Valvoline Oil Co.....	72
Vanderpool Company, The.....	8
Weed Chain Tire Grip Co.....	10

Salesmen, Agents, EVERYWHERE;

New auto fuel. Permanent, profitable. Tankil Chemical Co., 224 High St., Cleveland, Ohio.
Note display advertisement, page 71.

FOR SALE. Shop Vulcanizer, Bargain. Vanderpool, Springfield, O.

TIMES SQUARE AUTO CO. WORLD'S LARGEST DEALERS

In Automobiles, Accessories and Supplies. Selling Prices Lowest in the World. Send for our Latest Price Wrecker and Save Money.

TIMES SQUARE AUTO CO.
S. W. Cor. 56th St., B'way | 1210 Michigan Ave
NEW YORK | CHICAGO

**DEALERS, GARAGE MEN and
AUTOMOBILE AGENTS—**
To make money nowadays you *must* buy cheap. We sell supplies cheaper than any concern in the world. Send for our latest bargain bulletin.

MECCA MFG. & SPECIALTY CO.
1743 Broadway | 1208 Michigan Ave.
NEW YORK | CHICAGO

Accessory and Garage Journal

A Distinct Trade Publication

Guaranteed to Have an Exclusive
Trade Reader Distribution of

20,000 Copies
Each Monthly Issue

**Without a Competitor
in Its Field**

Detailed Advertising Information
at Request

Accessory and Garage Journal
Times Building, Pawtucket, R. I.

IMITATED
BUT NOT
DUPLICATED

**N O K A R B O N
E A G L E I N E
A U T O O I L**

THE OIL THAT SUITS
AND DOES NOT SOOT.

Carbon in your cylinders means loss of power. Customers report 10,000 to 15,000 miles with no carbon troubles. A good motto: TRY ANYTHING ONCE. EAGLEINE NO-KARBON AUTO OIL is furnished in 1-5-10 gallon, 30 and 50 gallon Steel Drums with faucets for which no extra charge is made.

**EAGLE OIL
AND SUPPLY CO.**

104 BROAD STREET, BOSTON, MASS.

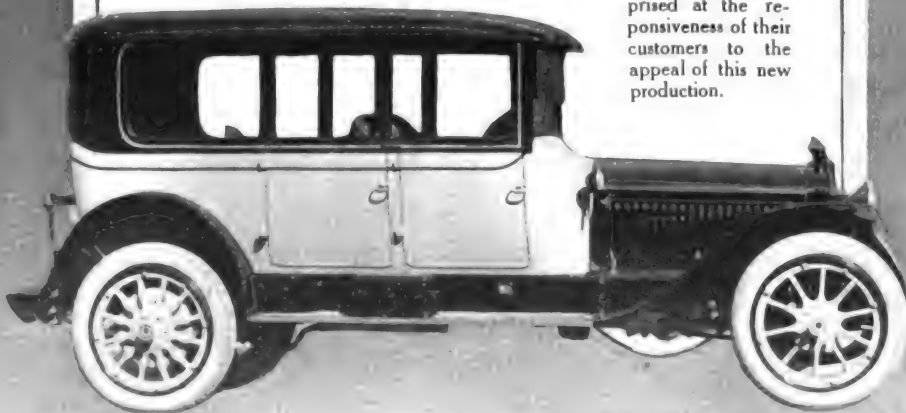
SPRINGFIELD CONVERTIBLE BODIES



THE limousine and the touring car are completely satisfactory only in certain seasons. The new Springfield Demi-Convertible body has no such limitations; it is the all-year, all purpose body.

More and more in America, as in Europe, the tendency is to demand protection from the sun, the dust and sudden showers even in touring. This body with its permanent top provides such protection, while it gives plenty of air and an unobstructed view. It may be converted into a limousine.

Dealers will be surprised at the responsiveness of their customers to the appeal of this new production.



SPRINGFIELD METAL BODY CO.

SPRINGFIELD, MASS.



It May Happen to Yours —whirled on skidding tires into a disastrous crash

Stop endangering your life as well as the lives of others. When streets are wet, always "chain your car to safety." Take no chances. Equip all four tires with

Weed Anti-Skid Chains

The ONLY Positive Safeguard Against Skidding

Safety demands that all tires be equipped with Weed Chains. It doesn't require the gift of second sight to see why this is true. Rubber slips—never grips. It slides on wet pavements and roads like a cake of soap on the moistened hands.

Rubber lacks the bite-and-hang-on ability to prevent skidding, while Weed Chains hold on like a bull dog, prevent side-skid and drive slip. Equip both front and rear tires with Weed Chains. Do it today—before it's too late.

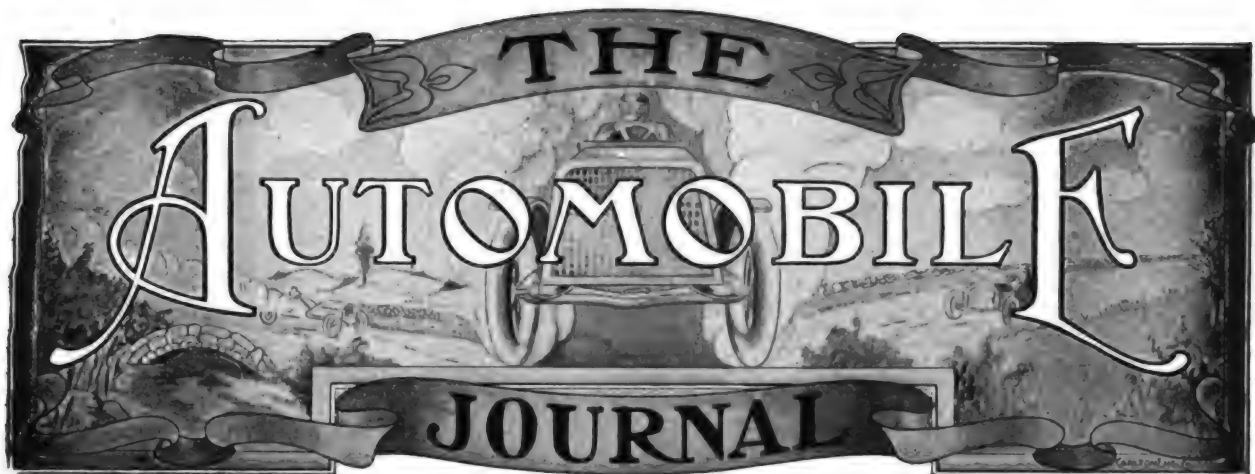
SOLD FOR ALL TIRES BY DEALERS EVERYWHERE

Weed Chain Tire Grip Company, . . . Bridgeport, Conn.

Also manufacturers of Motorcycle Tire Chains and Dobbins Blow-Out Chains



(When Writing to Advertisers Please Mention The Automobile Journal.)



VOL. XXXIX, No. 10

JUNE, 1915

Price, \$1.50 the Year

MOTORING ACROSS THE MOJAVE DESERT.

A Motor Car Tour Through the Heart of Arizona Which Will Be Illuminating to Automobile Tourists from States East of the Mississippi River.

MOTOR tourists from east of the Mississippi river probably have in mind a preconceived visualization of the State of Arizona as an arid waste of sand, rock, cactus and desert reptiles. Uppermost in his memory may be the tales of hardships and death encountered by travelers in the state in days of long ago. Sun-baked wastes, deep, clinging sand and alkalai, wide patches of black lava, with no signs of vegetation other than cactus and sickly mesquite, with never a drop of water, probably are the conceptions of Arizona in the minds of the average easterner.

Such erroneous impressions can be easily and pleasantly dispelled by a trip over the excellent highways leading through the state and through some of the most gorgeous scenery either in this country or in any of the Old World's commercialized show places. That at one time sudden death, or death by the slower

and more agonizing processes of starvation and thirst prevailed, there is no gainsaying. But that was back in the days when travelling was accomplished by prairie schooner or other slow

means. Modern highways and motor vehicles have robbed the district, particularly that once-dreaded Mojave desert, of its terrors.

Even the topography and the wealth producing occupations of Arizona have undergone a change in recent years. Agriculture now has an important position in the activities of the people, and in many sections are luxuriant stretches of fruit orchards, grain fields and flower beds. A trip through the state will force the admission that in historic and scenic treasures the commonwealth surpasses in

many respects some of Europe's most vaunted places of interest. Next in order of interest will be the discovery that the state contributes a surprising proportion of the

Announcement.

This article was especially prepared by J. Harry Minor, president of the Touring Information Bureau of America, and it is illustrated with scenes and strip maps from the bureau's tour book, the "TIB Automobile Route Book," which contains all in one volume exhaustive touring data of the nation.

The readers of The Automobile Journal will be interested to learn that this magazine has been selected, among all other motor journals, as the official organ of the Touring Information Bureau of America. By this arrangement, subscribers can secure any special touring information desired of any section of the country, particularly of the West. All readers are urged to take advantage of this opportunity and to write to this bureau at Kansas City, Mo. No charge is made for the service.



An Oasis in the Mojave Desert Where Warm Hospitality and Efficient Service Is Given.

beef and mutton produced for commerce in America, and that the wool clip from the sheep herds, to be seen on all sides, is a dignified item in the commerce of the region.

Arizona has the most extensive forest of pine trees in the United States that graces this vast Mojave desert. Another of the great resources of Arizona is forced upon the attention—its seemingly inexhaustible and almost incredibly rich mine products: Gold, silver, copper, zinc, precious stones, as well as a score of minor mineral substances that have value in the sciences, arts and commerce.

The roads run somewhat informally through the open country, but they afford most satisfactory travel. They are built of material at hand, which is admirable for the purpose, forming a semi-hard surface that has excellent qualities for automobile traffic.

The tour described herewith begins at Kingman, whose population numbers 2000, and which is the chief city and county seat of Mohave county. It is the centre of a mining region remarkable for the richness and variety of its products. Its establishments do a surprisingly large business as outfitting headquarters for surrounding mines, ranches and farming settlements.

It is a thoroughly modern little city with substantial public buildings, comfortable homes, up-to-date stores and every modern convenience for the en-

tertainment of tourists, including an excellent Harvey System hotel and first class garage accommodations. Enthusiasm for good roads permeates the community and great improvement has been effected throughout the surrounding country by their efforts.

The elevation here is 3400 feet, and the town is encompassed by mountain ranges—the Wallapai, the Cerbat and an escarpment of towering bluffs overlooking the wonderful Sacramento valley. Geologists say that nearly every mineral known to science is

found in the county of Mohave.

The Gold Road mine produces \$750,000 worth of bullion a year, the Tom Reed \$800,000, and the combined output of several smaller properties totals \$500,000. A very interesting side trip can be made from Kingman over the north road to the Tom Reed and Gold Road workings. The Golconda and Grand Gulch mines contribute a quarter million dollar output of zinc, lead, copper and silver, and the properties of the Needles Mining and Smelting Company add another quarter million, while large quantities of amethyst, turquoise and other precious stones are mined on the company's property.

The deepest and most picturesque sections of the Grand canon of the Colorado lie in Mohave county and lesser, but no less beautiful chasms, such as the Iceberg, the Black, the Boulder and the Mohave canons are also found here. Diamond



The Half Million Santa Fe Bridge at Topock, Which Measures 660 Feet Long and Is Planked for Motor Travel.

canon, which forms a junction with the Grand canon, 20 miles from Peach Springs, is equal in its way to the others. One of its features is the Diamond creek caves, which are of extraordinary size and beauty.

Out of Kingman two routes are available, one via Oatman and Gold road through the gold mining district, and the other via Yucca. The TIB pathfinder car travelled over this latter road, which is a fine new state highway.

From Kingman to Yucca the road follows a railway over newly constructed highway of very high quality most of the way. Yucca is an oasis in the desert with a population of 100 and a small hotel, of rough exterior, but warm hospitality and service of much better quality than might be expected. It is shown in an accompanying photograph.

In Yucca supplies should be replenished, as it is 30 miles to Topock, which is the Indian name for bridge, where the route crosses the Colorado river. The route angles west across many washes, where caution should be used against fast driving. Through the desert the road passes many mesas, which afford views of a striking character. For some distance it follows a dry river bed. There are no grades or hard climbing and no sand that can hinder travel.

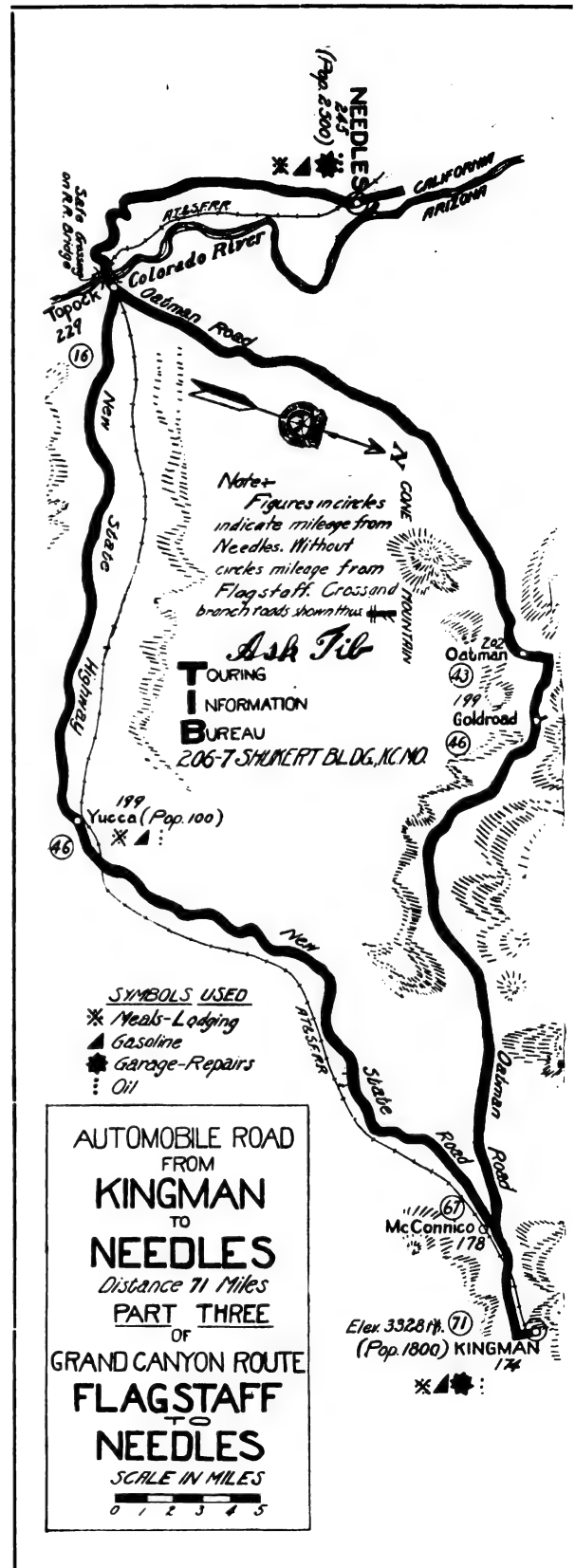
Short Cut Across Bridge.

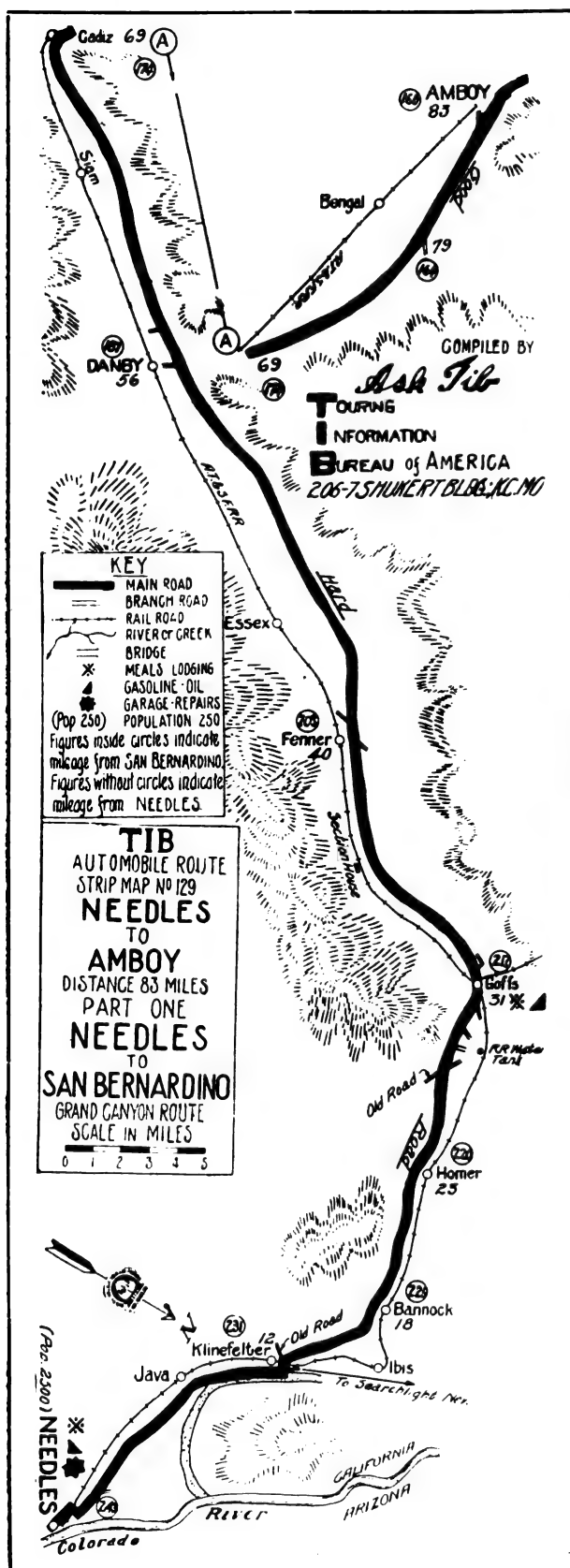
At Topock the route crosses the Sante Fe railroad bridge, which has recently been planked for motor travel. A toll of \$3.50 is collected for car and passengers. The bridge is equipped with an automatic system of block signals, which insures against the possibility of meeting a train while crossing.

The bridge is a massive structure and an engineering achievement of much interest. It is of the cantilever type and the single span is 660 feet long, with 165-foot cantilever arms, one of the longest structures of its type in the world. It cost half a million dollars to construct.

The planking of the bridge is a great convenience to the tourist, eliminating as it does the former necessity of shipping a car by rail from Topock to Needles; a distance of 16 miles. This bridge replaces a pile bridge that formerly spanned the Colorado several miles to the north, where the shifting channel of the stream kept the railroad engineers in constant apprehension. The new bridge is placed among the rock obelisks, called the Needles, which guard the entrance to the Mohave canon. Its foundations are on rock.

The north road from Kingman, also given on the accompanying strip map, is largely new and





has been built by private capital through the gold mining regions. It takes the tourist through a more mountainous country.

After the passage of the Colorado river the tourist shortly arrives at Needles, the southern gateway to California and the beginning of the trip across the Mojave desert. Needles is the terminus of the steamer traffic on the lower Colorado river to the gulf of California.

It is the home of the remnant of the once warlike Mojave Indians, and it possesses many interesting scenic and historic features. It is a natural winter resort and offers the tourist finely oiled streets and well kept highways through the surrounding country. Two divisions of the Sante Fe railroad end here and there is an excellent Harvey System hotel, "El Garces," which is named for Francisco Garces, a Spanish priest, who visited the place in 1771.

The Mojave Indians are certain to thrust



Typical View of the Arizona Canyons.

themselves upon the attention of the stranger. The one time warriors are a beggarly, slotafu lot, much out of place in their new environment. The women are picturesque and employ themselves peddling pottery, bows and arrows and other trinkets. The men are gigantic in stature and are famed as runners, but they do not work.

One of the points of interest of the vicinity is the Mojave Indian mystic maze, 10 miles out of Needles, and there is much more of interest to be seen in ramblings along the river to the home of the Chemehuevi Indians, as well as a series of remarkable views about Eagle mountain and the Black buttes. Good fishing and boating may be had on the Colorado river.

Across the Mojave Desert.

Needles is a thriving western town of 3500 population, and its people have shown great en-

ergy in opening up a fine modern road across the formerly dreaded Mojave desert. Every possible requirement of the tourist may be supplied at Needles.

By the time he begins to cross the desert the eastern tourist will have learned to discount heavily the tales of hardships in motoring through this part of the country. This has been the chief bugaboo of the transcontinental journey.

Those conditions of long ago contrast sharply with the modern, well oiled road across the desert, which has of late years been constructed at a cost of from \$10,000 to \$15,000 per mile. The 165 miles of this road from Needles to Barstow can be traversed by an ordinarily good car in eight hours. The road follows the Sante Fe railroad and in case of accident a signal to a passing train will bring the crew to the rescue, under a standing order of the railroad company. Fre-

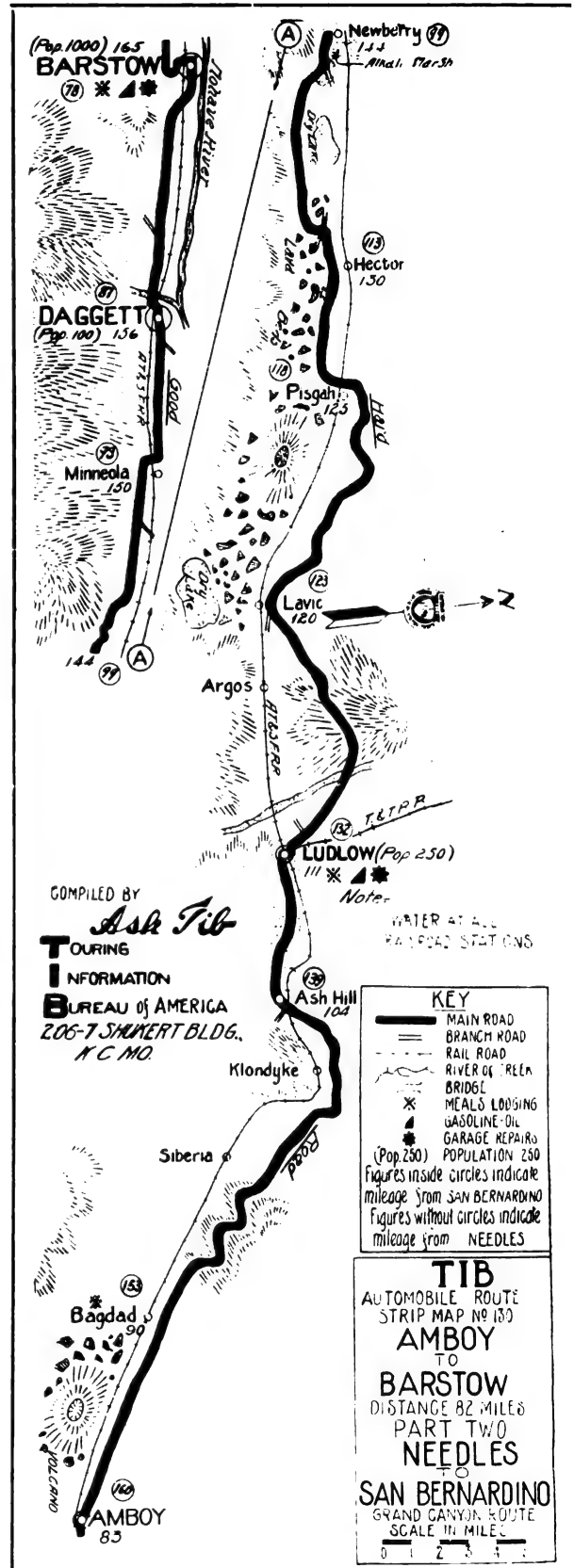


Substantial Bridge Over Arroyo, South of Kingman.

quent stations provide water and supplies for the car, while food may be had at Ludlow and Bagdad.

The safety and comfort of the motor journey that has been described are as great as for one of equal length in almost any other section of the country. Father Cyprian Fabre of Flagstaff, who has been very active in the good roads movement, as well as in other efforts to develop the section, was approached by an eastern publication some time ago with the suggestion that some sort of police system be arranged in Arizona to convoy transcontinental tourists across the country.

He replied that such a thing was as necessary through Arizona as it would be through the streets of Chicago. The road is so plainly marked that it cannot be missed, water stations are frequent and every few miles it is possible to secure gasoline, oil and other supplies. Garages and repair shops are numerous, and there are good ho-





Orange Groves at the Foot of the Mountain, Typical of Southern California and Arizona.

tels within easy travelling distance of each other.

The Mojave desert will inspire emotion in the breast of any traveller, but in none more than in the man or woman who may have traversed this region in the by-gone days of prairie schooners. Modern civilization has eliminated in large measure its perils, but, like the extinct volcano and the chaotic chasm, has left the desert as a monument of the parlous past.

The maps presented in these pages are absolutely accurate and are vouched for by the Touring Information Bureau of America, of Kansas City, Mo., which published them as an exclusive feature in the TIB Automobile Route Book. The maps are designed to take the place of the reading logs of ordinary route books, and to "carry the message" to the eye, as well as the brain. They indicate every crook, creek, culvert, cross roads, rail-road crossing, bridge, land mark or point of interest, as well as convenient supply stations en route, where supplies, repairs, meals and lodgings may be obtained.

The book contains a vast fund of touring information relating to the whole country, particularly to the western states, and are profusely illustrated and very well printed so as to afford the best service possible to the motor touring public.

The desert road is generally fast and good. From Needles to

Barstow, the last stop shown on the accompanying strip maps, is a distance of 165 miles.

Half way on the journey the tourist reaches Amboy, after having passed through numerous small communities, such as Goffs, Fenner, Essex, Danby and Cadiz. From Amboy the tour leads straight northward past lava and volcano beds to foot hills.

Between Ludlow and Lavic is what was once the worst stretch of the road. In former days it used to require about 20 hours to travel four miles in this section. At Barstow the tourist will find all the accommodations he will require. The Hotel Melrose is the official TIB station, and in addition there is a Har-

vey System house, named the Casa de Desierto.

Barstow marks the end of the desert trip for the westbound tourist, and is a live, energetic town of about 1000 population. Like Needles, on the other side of the desert, its financial interests are largely in mining. It is a picturesque little community, whose citizenry is keenly alive to the good roads movement.

The TIB Automobile Route Book presents a list of articles which the tourist should carry on this desert trip. It specifies among other things, a spade, an axe, tow line, electric lantern, the usual extras and tools, strong knife, emergency sewing kit, first aid emergency medicine kit, tire repair kit, extra clothing (some water proof, strong and warm), tire chains, firearms, thermos containers and desert water bags of canvas.



Characteristics of the Mojave Desert—Motorists Meeting on the Road.

GREAT RACE CERTAIN AT CHICAGO.

New Board Track With Sharply Banked Turns Is Much Faster Than Indianapolis Speedway—Resta Makes 110.1 Miles Per Hour.

THERE is likely to be even more interest for the motor racing fan in the first 500-mile race on the new Chicago speedway than there



Bob Burman Trying Out the Mechanism of His Machine.

was in the great classic that was run at Indianapolis. The preliminary trials have been so fast that it is reasonable to expect that even De Palma's great record at Indianapolis will be exceeded.

Prize money offered by the speedway will amount to \$54,000, which is \$4000 more than at Indianapolis. This has attracted the strongest possible field of contestants. Each of the 10 drivers who placed in the Indianapolis event are entered. It is rumored, however, that Ralph De Palma may not be able to ride because it may not be possible to repair his car in time.

In this race the cars will work under conditions that are entirely new on American tracks. While the Indianapolis speedway is banked to some extent, it is not sufficiently banked to permit the cars to round the corners at full speed. It has always been necessary there to shut off the engines at the corners. All the drivers in their preliminary work circled the Chicago track without once shutting off.

The result was the highest speeds in the elimination trials that have been made previous to any race. This is an indication of sensational results to come. The entry list includes all the drivers who made the best showing at Indianapolis and a number of cars which were entered for that race, but which did not compete because they could not be put in shape in time.

Dario Resta's time was the fastest in the elim-

ination trials. But his rate of 110.1 miles per hour was approached by several other cars who did better than 100. The great Stutz team, which showed such marvelous consistency at the Indianapolis track, gave another and even more surprising exhibition of the same quality. All three cars made more than 104 miles per hour and came within a few seconds of making the same speed.

Stutz Again Consistent.

Wilcox's rate was highest at 104.75 miles per hour; Anderson was next with 104.6 miles per hour, and Cooper third with 104.56 miles per hour. Burman's Peugeot made 101 miles per hour. Billy Carlson's Maxwell set a mark of 96.9 miles per hour, and the same mark was made by Charles Keene's F. R. P., one of the new Knight-engine types that failed to get ready for the Indianapolis race. Rickenbacher's Maxwell hit it up to 96.55 miles per hour; Tom Alley's Duesenberg went at 95 miles per hour; Grant's Sunbeam at 94.75. The Duesenbergs of O'Donnell and Willie Haupt each made 92.65 miles per hour. Limberg's Sunbeam made 90.8; Earl Devore's F. R. P. 89.55 miles per hour, and Tom Orr's Maxwell 87.4.

Resta kept his throttle wide open during every second of his sensational run and established a new world's record for cars of 300-inch piston displacement. The only car that has been driven faster on a similar track was Jean Chassagne's 12-cylinder Sunbeam at Brooklands, a car with greater piston displacement.

In addition to the cars already mentioned the



Billy Carlson Tuning Up His Racing Car.

following are also entered: Von Raalte and Porporato, Sunbeams; Chevrolet in a Delage; Babcock in a Peugeot; Brown in a Du Chesneau;



Gil Anderson Prepared for the Start.

two Mulford specials; Henning's Mercer special; Zucker's Berwyn Baby; Joe Cooper's Sebring and Johnny Mais, Mais Special. There are 29 in all and a speed of 85 miles per hour in the eliminations is necessary to start. This is five miles faster than was required at Indianapolis.

After trying out the new track thoroughly the drivers were unanimous in saying that it was the fastest on which they have ever driven. It was the opinion of those who watched the trials that the race would be the fastest that has ever been driven in America, and yet it is also likely that there will be more motor trouble than has ever been experienced in a 500-mile race.

Engine Trouble Expected.

Ralph De Palma thinks that while the best cars were too fast for the Indianapolis track, the Chicago track will be too fast for the cars and that considerable development of motors will still be necessary before the best time of which the track is capable can be got from it.

He believes that the shut downs on the turns at Indianapolis saved the motors for short periods, allowed them to cool off and permitted lubricating oil to work up into the mechanism while the car coasted. That will be impossible on the new track, for the motors will be under load every minute of the time.

It is also predicted that the race will be the

easiest on the drivers that has ever been run. The cars go into the turn and hold it at whatever level the start is made with almost no direction from the drivers. Harry Stutz, the backer of the Stutz team, believes a car could make 140 miles an hour on the track if it had the power.

Opinions are a unit that the race will be extremely fast and because of the new conditions great curiosity will be felt in engineering circles as to the manner in which the cars meet them. The race was scheduled originally for June 19, but it was postponed until June 26 because of rain and the short street car strike in Chicago, which occurred just before that date.

DUESENBERGS WIN AT GALESBURG.

Three Duesenbergs led a field of 11 starters in the 100-mile race on the one-mile dirt track at Galesburg, Ill., June 9. They captured \$2500 of the \$3000 prize money that was offered for the race. The two other cars to finish inside the money were W. W. Brown's Du Chesneau and Joe Cooper's Sebring. The Sebring is equipped with a Duesenberg motor.

None of the five cars which got prizes stopped during the race for any cause. O'Donnell took the lead at the start and held it throughout the race, although closely pursued by Alley. O'Donnell's speed for the race was 62.5 miles per hour. Alley was a little more than four seconds slower, and Chandler followed him by 25 seconds. Cooper came a half minute later and Brown was five minutes behind him.

ROMANO WINS AT SEATTLE.

An eight-cylinder Romano car, equipped with a Curtiss aeroplane motor and driven by Rae Lentz, won every event in which it was entered on the half-mile track at Madison park, Seattle, June 12 and 13. In a one-mile trial against time the car made the distance in 1:03 3/5, the best



DARIO RESTA



RALPH DE PALMA



EDDY J. KENBACHER



BOB BURMAN



RALPH MULFORD

time ever made on a half-mile track. The Romano has made a clean sweep on the Pacific coast this year in all the events in which it has been en-

uled for Sioux City, Ia., July 3; Tacoma, Wash., July 4 and 5, and at Omaha, Neb., July 5. Some of the racers participating at Chicago will also compete in all three cities, but owing to the distance between the locations there is not sufficient time for the drivers in the middle west contests to arrive on the Pacific coast.

DRIVERS IN THE 500-MILE RACE AT CHICAGO AND ELIMINATION TRIAL TIME.

Driver and Car	Time	M.P.H.	Driver and Car	Time	M.P.H.
Resta, Peugeot.....	1:05.4	110.1	Haupt, Duesenberg....	1:16.7	93.8
Wilcox, Stutz.....	1:08.7	104.75	Babcock, Peugeot.....	1:17.0	93.2
Cooper, Stutz.....	1:08.8	104.6	Joe Cooper, Sebring....	1:18.0	92.3
Anderson, Stutz.....	1:08.8	104.6	Rawling, Ogren.....	1:18.30	92.0
Carlson, Maxwell.....	1:09.78	103.1	Hughes, Porter-		
Rickenbacher, Maxwell	1:09.9	103.0	Knights.....	1:18.98	91.1
Burman, Peugeot.....	1:11.3	101.0	Limberg, Sunbeam.....	1:19.3	90.8
Van Raalte, Sunbeam..	1:11.45	100.6	Orr, Maxwell.....	1:20.3	89.8
Porporato, Sunbeam..	1:12.96	98.6	Devore, Porter-Knight	1:21.3	87.3
Keene, Porter-Knight..	1:14.2	96.9	Mulford, Mulford Spe-		
Chevrolet, Delage.....	1:14.3	97.0	cial.....	1:23.75	85.9
O'Donnell, Duesenberg	1:14.7	96.4	Brown, Du Chesseau		
Grant, Sunbeam.....	1:14.8	96.2	Vall, Mulford Special		
Alley, Duesenberg.....	1:15.9	95.0	Zucher, Berwyn Baby		
Henning, Mercer.....	1:16.0	94.7	Mais, Mais Special...		

tered. The Seattle event ended the season for northwest racing.

LIGHT CAR RACES AT TEANECK, N. J.

Short distance races for light cars will be run on a straightaway course at Teaneck, N. J., July 4, sanction having been given by the Light Car Association of America. President Charles J. Percival of that organization will referee.

There will be a half-mile event from a standing start and a half-mile from the flying start. There will also be a two-mile event for cars up to 364 inches piston displacement. Queen Ann road has been carefully prepared for the event. There are no cross roads on the stretch and the course will be fully guarded by a uniformed division of the First Naval battalion of New York state under Lieut.-Com. W. E. Connolly.

THREE BIG RACES IN JULY.

The first week of July will be a busy time for the racing stars of motordom. Meets are sched-

guished company, however, in Barney Oldfield, Ruckstell, Pullen, Burman, Earl Cooper and others.

Preparations at Sioux City are maturing satisfactorily, and the two-mile dirt course is said to be in excellent condition. Seventeen entries had been received two weeks before the race date. A like number was reported from Tacoma, and it was stated that on the first day, July 4, there will be held one race for 250 miles on the new two-mile board speedway, while on Monday there will be two races of 100 miles each and one at 200 miles. Sixteen entries were reported from Omaha, where the principal event will be a 300-mile contest on the new 1¼-mile board track on which the finishing touches are now being made.

During 1914 the Goodyear Tire and Rubber Company used 1,325,259 pounds of paper, valued at \$33,131.48, for shipping purposes.

Exports of automobiles and carriages from the United States to Porto Rico last year amounted to \$529,000.



LOUIS CHEVROLET



JOHNNY AITKEN



WILLIE HAUPT



J. PORPORATO



GEORGE BABCOCK

OLD FIRM TO MAKE TRUCKS.

For 30 years the J. C. Wilson Company, which is about to embark on the manufacture and sale of trucks, has produced vehicles in Detroit. The product of the concern has always been of high quality and has borne a very good reputation.

A large plant has been secured at 15th street and Warren avenue. The company takes up the business with ample experience, proven ability and large resources. More than a year and half has been spent in developing the worm and chain drive trucks to sell at \$1800 and \$1950, which the company is to build.

The trucks are said to be of conservative de-



John Altken, Head of the Experimental Department of the National Motor Vehicle Company, Driving the National Highway 12-Cylinder Car at Indianapolis in a 500-Mile Test.

sign, with much attention given to accessibility and flexibility. The product will be marketed exclusively through agents. In June, Stanley C. Wilson, secretary of the company, will make a trip to the Pacific coast by central route, returning by the northern route, during which he will appoint dealers for the product in the leading cities.

PAN-AMERICAN ROAD CONGRESS.

The executive committee of the Pan-American road congress, meeting in New York City recently, set the week of Sept. 13 as the date for the gathering of the congress and named Oakland, Cal., as the meeting place. The Panama-

Pacific Exposition authorities have been asked to set aside one day during the week of the congress, to be known as Pan-American Road Congress Day.

It is believed that the attendance will include the chief road builders, not only of the entire United States, but of Canada and South America as well. Papers will be read by the greatest experts on road construction on this hemisphere.

GASOLINE FROM SYNTHETIC OIL.

A process by which kerosene, vaseline, paraffin, rod wax, or any of the other natural hydrocarbons can be transmuted into synthetic crude oil which will yield 15 per cent. of its volume in the best quality of gasoline is described by Walter O. Snelling in a paper read before the Trans-American Mining Institute in February.

He says that in performing some experiments for another purpose he heated a quantity of transparent lubricating oil to a high temperature under pressure and found on removing it from the retort that it had been transformed into a substance resembling in every way Pennsylvania crude oil of the best quality.

It was a long time before he managed to reproduce the exact conditions under which the heating had been carried out and get again the same result. When he did he found he could substitute any hydrocarbon for the one originally used.

From the resulting oil 15 per cent. of the best gasoline was always obtainable and about 40 per cent. of burning oil.

WANTS FORD CONTRIBUTIONS.

C. L. Newcomb, president of the Lincoln Highway Association in Colorado, has proposed to the headquarters in Detroit that a campaign be begun to urge the 300,000 Ford purchasers who are to receive rebates of about \$50 each on the cars they have purchased this year, to turn \$5 of this into the Lincoln Highway Association. This would create a fund of \$1,500,000 for the improvement of that road. An effort is being made to have Henry Ford give his support to the scheme, but with what result is not known.

GENERAL NEWS OF THE INDUSTRY.

Merger of Baker Electric and Rauch & Lang Involves \$2,500,000—King Has New Head Officials—Goodyear Enlarging—Studebaker Sales Increase.

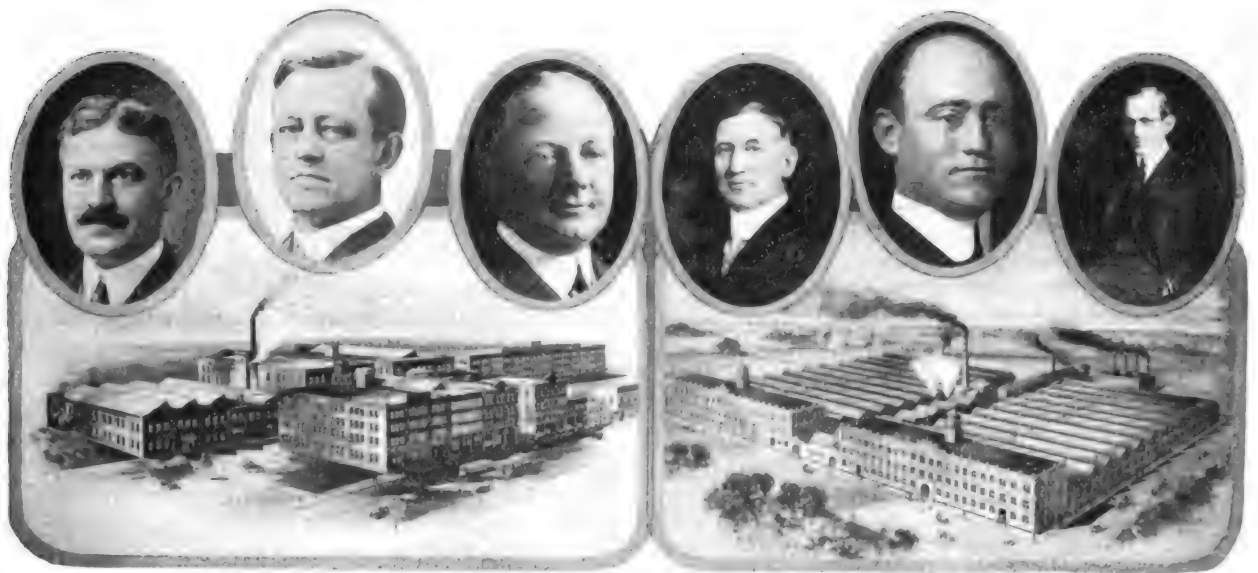
CONSOLIDATION arrangements of Baker Motor Vehicle Company and Rauch & Lang Carriage Company have been completed. This combination of two of the oldest and strongest manufacturers of electric vehicles in the country marks a very important development in that industry.

Baker electrics and Rauch & Lang electrics are well known throughout the country because of their excellence. The joining of these two companies will enable the new company, which will be called the Baker R. & L. Company, to furnish the most perfected service facilities.

Kelly of the Baker company, treasurer and secretary, respectively; F. W. Treadway of Rauch & Lang will be general counsel.

WARD HEADS KING COMPANY.

Following the announcement of the resignation of J. G. Beyerline from the presidency of the King Motor Car Company comes the statement that the directors have elected Vice President and Advertising Manager Artemas Ward, Jr., to the vacated office. F. A. Vollbrecht, formerly secretary and treasurer, has been selected as vice



Officials of the New Baker R. & L. Company: Left to Right, C. L. F. Wieber, President; F. W. Treadway, General Counsel; C. E. J. Lang, Second Vice President; Fred R. White, First Vice President; R. C. Norton, Treasurer, and G. H. Kelly, Secretary. In Same Order Are Plants of Rauch & Lang and Baker Companies.

The new company will have a capital stock of \$2,500,000, and it will occupy a position of unusual strength in the motor car industry. Of the capital stock \$1,750,000 will be common stock and \$750,000 will be 7 per cent. cumulative preferred.

Charles L. F. Wieber, president of the Rauch & Lang Carriage Company, will be president of the new company; Fred R. White of the Baker Motor Vehicle Company, first vice president; Charles E. J. Lang of Rauch & Lang, second vice president; Robert C. Norton and George H.

president and general manager and will also continue as treasurer.

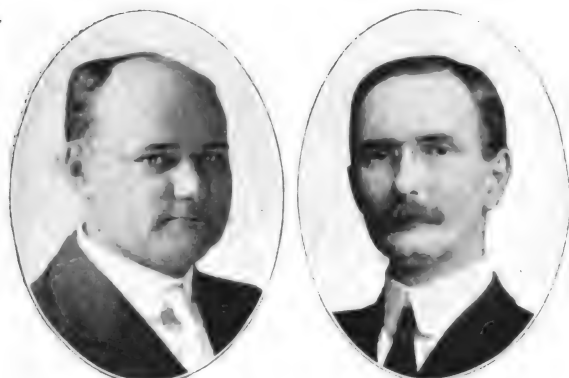
The first announcement was made at a dinner given to Mr. Beyerline at the Hotel Statler, Detroit, June 14, he stating that other plans which he had been formulating caused him to sever his connections with the King company, in order that he might devote his undivided attention to the new proposition. His plans have not yet been announced. The officials expressed regret at his decision.

As a result of the changes, J. B. Siegfried, factory production manager and purchasing agent, takes the position of assistant general manager in charge of the factory; J. R. Emerson becomes purchasing agent; W. E. Daly continues as sales manager, while H. C. Bradfield assumes the duties of sales promotion and advertising manager at the factory.

GOODYEAR EXPANDS.

Five acres of additional working floor space are included in plans approved by the directors of the Goodyear Tire and Rubber Company, which will begin at once an extension of the Akron factory made necessary by the continued growth of the business. This will give the plant a total floor space of nearly 50 acres.

The new buildings will be ready, with ma-



Artemas Ward, Jr., President (at Right) and F. A. Vollbrecht, Vice President, King Motor Car Company.

chinery installed, by Nov. 1, and will require for their use 2000 additional men, bringing the Goodyear working force to a total of 10,000 men. The production capacity will be increased from the present 12,000 tires a day to over 15,000.

The cost of the plant enlargement will be about \$400,000, and all the buildings will be of brick and steel, to harmonize with the present plant, and room will be found in them to extend the manufacture of mechanical goods.

BERRY GOES TO OVERLAND.

The Willys-Overland Company announces the appointment of George M. Berry as advertising manager. He will assume complete charge and supervise all work in connection with the various branches of the department.

Mr. Berry was formerly associated with the Thomas B. Jeffery Company, Kenosha, Wis., where he held the important position of second

vice president and treasurer. He became affiliated with the Willys-Overland Company 18 months ago. During that time most of his energies have been directed toward the building up of the advertising department, in which he has had extensive experience. The present efficiency of this Overland department is largely due to his constructive work.

STUDEBAKER SALES INCREASE.

The Studebaker Corporation is reported as having had a very satisfactory five months, ending June 1. The sales during that period show an increase over last year of from 15 per cent. to 20 per cent., despite the slowing up in May owing to weather conditions, which impeded delivery throughout the central west.

Officials of the company state that there continues to be a good demand for the Studebaker car by the Allies. The largest percentage of the demand from the belligerent nations was for Studebaker harness, but the motor vehicle shipments are substantial.

HAYNES COMPANY CHANGES.

Four important organization changes have taken place in the Haynes Automobile Company, Kokomo, Ind. R. Crawford, who joined the company some years ago in the capacity of advertising and publicity manager and has been directing the sales of the company for the past 18 months, has been promoted to general sales and advertising manager.

D. L. Watson, who has been with the Haynes company nearly 10 years, advances from assistant sales manager to sales manager, while his former position is taken by J. L. Larkin, previously sales promotion manager.

S. A. Merinbaum is promoted from advertising manager to the office of sales promotion manager, which promises to be one of the most important offices in the entire Haynes organization.

Herbert A. Minturn succeeds Mr. Merinbaum as advertising manager, he having previously occupied the position of manager of the Haynes technical bureau. It is probable that some Purdue university graduate will succeed to Mr. Minturn's office. H. R. Perry retains the position of assistant advertising manager to which he was quite recently appointed.

This announcement comes closely after that which stated that the Haynes company had terminated the most prosperous season in its his-

tory, that during the season the dealers' organization had been increased by 676; sales showed an increase of 165 per cent.; that extensive factory additions have quite recently been made.

PROMOTIONS IN STEARNS COMPANY.

The F. B. Stearns Company, makers of the Stearns-Knight cars, Cleveland, O., announces the promotion of T. A. Boyle to the position of advertising manager and manager of the service department, and Guy W. Vaughan to the position of special sales representative.

In commenting upon the advancements, Frank B. Stearns, president of the company, said: "It has always been our policy to develop in worthy men an intimate knowledge of our methods and aims and by giving them practical experience in the various branches of our organization, thereby fitting them for advancement when the opportunity is presented."

Mr. Boyle was assistant advertising manager, and has been with the Stearns company eight years. Mr. Vaughan, for the past two years chief of the experimental department, is widely known as a champion race driver and holder of a number of trophies. He has been intimately associated with Stearns cars and motors for nine years, serving part of this time with eastern distributors.

COLE FACTORY IS BUSY.

J. J. Cole, president of the Cole Motor Car Company, Indianapolis, announced that during the month of May all Cole sales records since the inception of the company were broken. Forty per cent. more cars were shipped than in any other month in the company's history.

In the first week of June 90 car loads were shipped from the Indianapolis plant, and it was expected that during the remainder of the month this would be increased to 100 car loads or more a week.

RANNEY TO HANDLE KINGS.

Samuel S. Toback, president of the A. Elliott Ranney Company, formerly distributor for Hudson cars in New York City, announces that a contract has been closed whereby his organization will handle the eight-cylinder King product of the King Motor Car Company, Detroit. The Ranney company has taken the building occupied by the King in the past, Broadway and 52nd

street, and a new service station for King owners is being inaugurated by Mr. Toback.

RICE HEADS WAVERLEY.

The Waverley Company, electric vehicle manufacturer, Indianapolis, Ind., announces the retirement of President William B. Cooley and the elevation of Herbert H. Rice, former vice president, to the vacant office. This change consummates the wish of Mr. Cooley, who desired to withdraw some time ago.

The company reports that its financial strength will not be impaired, but in fact will be increased through the gain of new financial support.

Mr. Rice received his training with Col. Albert Pope in the early bicycle days, and when the Pope Motor Car Company acquired the Waverley factory in 1904 he was sent to Indianapolis to take charge. Wilbur C. Johnson, also of the Pope company, joined the Waverley



S. S. Toback, President of A. Elliott Ranney Company.

branch at about the same time. He now becomes vice president of the reorganized Waverley company. These two men organized the present Waverley company in 1908 and have been active in its management since then.

MADISON MOTORS FORMED BY GIBSON.

Cecil E. Gibson, formerly treasurer of the Gibson Automobile Company, Indianapolis, and until recently general manager and one of the largest individual owners of the Empire Automobile Company, has disposed of his interests in those concerns and formed the Madison Motors Company, which is to manufacture light four and six-cylinder cars.

Six-cylinder models, priced at \$1375, are al-

ready being manufactured and shipped at the company's plant at Anderson, Ind. A 112-inch wheelbase four-cylinder model will soon follow. Its price is given as \$750 and a heavy production is planned.

ECCLESTON LEAVES APPERSON.

Apperson Brothers Automobile Company, Kokomo, Ind., announces that J. B. Eccleston has retired from the position of sales manager, which he held since Sept. 1 of last year. His work has been taken over by Vice President T. E. Jarrard. J. H. Newmark will assist Mr. Jarrard and will continue in charge of the advertising department.

This year marks the 23rd manufacturing year of the company, and it is said that extensive building plans are now under consideration by the company.

CANADIAN PLANT FOR CHEVROLET.

Dispatches from Toronto, Canada, indicate that interests connected with the Chevrolet Motor Company of New York City, will in the very near future establish a plant in that city.

The report is that the plant will have a capacity of 15,000 cars per annum and will supply some of the British colonies, as well as the Canadian trade. Thomas Houghton, formerly with the Dominion Carriage Company, West Toronto, is said to have been engaged as production manager.

BUSINESS INCREASES 117 PER CENT.

At the semi-annual directors' meeting of the Chase Motor Truck Company, Syracuse, N. Y., it was shown that during the first five months of the present year the business done by the company was 117 per cent. greater than for any like period during the company's nine years of business. A great part of this business can be attributed to the success with which the new water cooled worm driven Chase trucks are meeting. It is felt by the officials that a large measure can also be accounted for by the policy of the company to devote its entire energies to its domestic trade instead of to foreign war orders.

POPE TO SELL TO MAXWELL.

Col. George Pope, receiver of the Pope Manufacturing Company, has been granted permission by the superior court of Massachusetts to sell

to the Maxwell Motor Company, Detroit, an option on an unexpired contract for automobile tires signed by the Hartford Rubber Works, now part of the United States Rubber Company.

The contract provides for a large number of tires of a certain size at prices that are highly advantageous to the automobile company. The price to be paid, in spot cash, by the Maxwell company is stated as \$70,000.

MILLION DOLLAR AUTO AGENCY.

The Carl H. Page Motors Company, the new million dollar eastern distributing agency for the new Mitchell six and eight-cylinder models, has completed its executive and sales staff, as follows:

Carl H. Page, president; George W. Hipple, first vice president and general manager; Richard D. Willard, second vice president; Daniel A. Young, treasurer; Henry D. Leary, secretary; Walter H. Van Deusen, director of wholesale sales; Jay Harold Johnson, general retail sales manager; J. A. Clark, metropolitan sales manager; Wallace Owen, manager exchange car department; Al Camacho, manager service department.

CAMPBELL BECOMES SECRETARY.

The Tuthill Spring Company, Chicago, Ill., manufacturer of the Tuthill titanic no-centre bolt automobile and truss springs, announces the promotion of D. S. Campbell to the secretaryship of the company. Mr. Campbell has been identified with the company for the past nine years, acting as sales manager during the last two. While in charge of the sales he made the company's product very well known throughout the United States and Canada, his advertising slogan being: "You carry a spare tire—why not a spare spring."

Although a comparatively young man, Mr. Campbell is felt to possess those qualities which will make his occupancy of his new office as notable as when he directed the sales department.

The Willys-Overland Company has declared the regular quarterly dividend of $1\frac{3}{4}$ per cent. on the preferred stock, payable July 1 to stock of record June 24.

At a special meeting of the stockholders of the Burd High Compression Ring Company, Rockford, Ill., it was unanimously voted to increase the capital stock from \$50,000 to \$200,000.

HIGH GEAR HILL CLIMBING WITH COLE EIGHT.

SMOOTHNESS and consistency of operation is a characteristic of the Cole eight-cylinder chassis as demonstrated to members of the staff of the Automobile Journal by a representative of the Cole Motor Sales Company, Rhode Island agent for Cole cars. A demonstrating car was given a very thorough trial for the purpose of learning its qualities of control and power, and this consisted of driving through traffic and climbing exceedingly steep gradients from rolling starts, work that would be regarded as exceedingly creditable for any machine to do.

The trial was made with a freight of four passengers, which would be an average load for a machine, and before the start was made the gear shifting lever was removed and the opening in the gear box covered with a cloth to prevent the lubricant slopping on to the footboard. This necessitated entire regulation of the vehicle speed by the variation of the motor, including the starting. The demonstrator left the gear shifting lever behind and the drive of approximately 15 miles was made entirely on direct drive.

In starting the car moved as easily as if it were in the low gear ratio, and it was driven at a speed from three to six miles an hour, through fairly heavy traffic, the engine having abundant power at the minimum named. Street cars and other vehicles were followed, several stops being necessary, and the instructions of the traffic officers necessitated turns and careful work.

Turning from traffic at a speed of three miles an hour the car was driven up the High street hill in Pawtucket, accelerating very smoothly and evenly to 15 miles in a climb of about 150 yards. The gradient of this hill is such that few cars make the ascent on high speed when moving so slowly, and the machine gathered headway in a surprisingly even manner.

Driving a short distance and making one descent and two sharp turns at very slow speed, one of the worst hills in Pawtucket was reached, this being Blackstone street, from Hamilton to High streets. This street is short, there being about 150 feet of slight ascent, and then the hill

rises at the gradient of 17.10 inches to the 100 feet for about 150 feet, with a right angle turn into High street, which at this point is 30 feet wide. The stiff grade and the combination of short start and sharp turn made the climb practically dependent upon quick engine acceleration, and the machine took the hill easily, rising over the crest at least 10 miles an hour, and from that point taking up an eight per cent. grade climb to Clay street. This was as difficult a test as any motorist could wish for both power and control.

Continuing on the demonstration was on the Weeden street hill from Smithfield avenue to the Stump hill reservoir. This was the course for automobile hill climbs for a number of seasons



Cole Eight-Cylinder Car Used for Traffic Driving and Hill Climbing Tests with the Gear Shift Lever Removed.

and there is a slight descent for about 100 yards, then a climb on a curving road for about 250 yards that will average from 20 to 25 per cent., and then a straight rise to the crest of 15 per cent., the distance being a half mile. The hill was soft and wet in places and the driving was necessarily with caution, but the car went up like a swallow and when near the top showed 40 miles an hour. The start was rolling and the full power could not be used because of the condition of the hill, until after the steepest part had been passed. It was a capital showing of the flexibility and capacity of the motor. The other tests were made for slow driving on several steep and soft ascents, all of which were equally as satisfying of the possibilities of the machine without gear shifting, demonstrating that driven by an experienced man there would seldom, if ever, be need of other than direct drive.

STUDYING TRAFFIC SYSTEMS.

CITY officials everywhere are giving the closest attention to the possibilities of improving methods of handling street traffic. There is every likelihood that this important feature of city management will be much more efficient all over the country in a few months.

A well supported movement to adopt a standard system of traffic regulations, which will be used in all cities where unusual conditions do not interfere, was launched recently at the meeting of the traffic committee of the Safety First Federation of America in Detroit. Work on the details of the plan has already begun.

This committee was much impressed with the system of cross walks and safety zones painted in white on Detroit pavements, and it is quite likely that this

street and Fifth avenue, in New York City, has been suggested by Dr. T. Kennard Thompson, a civil engineer, which will be presented to the Safety First Society for approval. It has already been accepted by a committee of that organization.

Forty-second street from Madison and Sixth avenues has a grade of 10 feet in either direction to Fifth avenue. Dr. Kennard's plan is to lower Forty-second street so that it will have a down grade of five feet instead of an up grade of 10 to Fifth avenue. The avenue would then be carried over the street on a bridge at its present level.

Ornamental stairways and elevators would lead into the present Forty-second street stores. Under Fifth avenue, at the crossings, stores



Safety Zone System and the Police Semaphores Employed in Detroit Traffic Regulation at One of Principal Squares.

will be an important feature of the standardized plan.

Photographs reproduced herewith, which were furnished by Police Commissioner John H. Gillespie of Detroit, give a good idea of how the system works.

One of the important points in the plan is the marking off at points where trolley cars stop, of zones into which a vehicle must not enter, and which are reserved exclusively for pedestrians waiting for trolley cars. Detroit has also adopted a system of hand operated semaphores, by which the traffic policemen signal traffic to stop and proceed.

A plan to relieve congestion at Forty-second

could be built, forming an attractive arcade.

The subway at this point is 35 feet below the surface and it would be possible to make the change without encountering marked difficulties as to the space in which sewer, water, gas and electric conduits should be placed.

There is a rapidly growing feeling in New York City that present traffic arrangements—even though they are the best that can be had without altering the present streets—are such as to involve great loss of time and increase of expense to business houses and individuals, and that the city must take aggressive steps toward remedying matters even at the cost of expensive reconstruction.

JITNEYS STRUGGLE AGAINST ODDS.

REPORTS of new regulations for jitney 'busses from all parts of the country indicate that the 'bus is having a hard struggle with the political power of the established transportation agencies. In many places it is being all but eliminated from the field by severe requirements upon its operation.

A new development in this fight is the entry of union labor as an enemy of the 'bus. This has been accomplished in many cities through the influence of the street car men's union, who believe that if the 'bus succeeds it will throw many members of that organization out of employment.

In a few places the union activity has taken the form of declaring the 'bus unfair. In others the 'bus owners and drivers have been given the opportunity of joining the drivers' and teamsters' unions, with the alternative of a union ban if they fail to come in.

There is one bright spot for the 'bus owners in all this opposition. It is a favorable report by the Public Utilities Commission of the District of Columbia, which was made after a careful investigation of conditions in New Orleans, Los Angeles, San Francisco, Kansas City and St. Louis.

This report defines the jitney as a five or seven-passenger car operated by the individual controlling it, for carrying passengers, usually at a five-cent fare, and conducted practically as a public hack except that it has no fixed stand.

"I am convinced the jitney has shown for the first time in the history of modern transportation that there has come into practical use a vehicle which for short and possibly for long hauls has made possible competition with the street railways that must be seriously considered," said Conrad H. Syme, general counsel for the commission.

"The service possesses that which the street car lacks—flexibility. It can be bent and directed according to the flow of traffic from hour to hour in every possible direction. It can be made to meet all the emergencies of unusual conditions. It holds out great possibilities for usefulness, provided it is able to continue running at five cents a ride, but in my judgment the jitney cannot be profitably operated if it is stringently regulated.

"I am not at all clear in my own mind that it is either right or necessary to exact heavy indemnity bonds from the drivers of jitneys. They are

no more dangerous than any other motor vehicle. So far as the people of a city is concerned their right to this modern, rapid, comfortable and elastic form of transportation seems apparent."

Asked to Join Unions.

In Springfield, Mass., the jitney men were given the option of joining the drivers' union by a certain date or being placed on the unfair list. The union had made an attempt to organize them, but had met with much opposition. All union men will be asked to refrain from patronizing the jitney in Springfield, where about 30 'busses are in operation, and the result is expected to be a valuable aid to the street railway company in its effort to keep its patronage. At Rock Island, Ill., the 'busses have been put on the union unfair list.

In Philadelphia a grand jury has been considering the jitney situation. After going over it thoroughly it delivered a report, the chief feature of which was a criticism of the inexperience and lack of physical fitness of the jitney drivers for their work.

The usefulness of the 'bus was conceded, but traffic regulations were drawn up which, under a new Pennsylvania law, can be enforced by the city. At about the same time the Philadelphia Chamber of Commerce drew up a set of regulations approving of jitneys in the abstract, but suggesting that they be so regulated that they could not injure the street railway company and could only operate over routes which are not now covered by the street railway.

The Public Service Magazine, representing the street railway point of view, believes that the dates demanded by the bonding companies for indemnity bonds are such that it will be practically impossible to continue the operation of 'busses in towns where such bonds are required.

In Cleveland, where the street railway fares are three cents, the jitneys have not been able to secure sufficient patronage to develop to any considerable extent, although a few are operated. The city controls the operation of the street car lines under an arrangement whereby a drop in patronage would doubtless result in an increase of street car fare, so that the public is, on the whole, more interested in continuing the present street car fares than in the development of a jitney system.

The Syracuse Rotary club recently sent out a circular letter to its members, calling attention

to the taxes paid by the street railway system to the city, the number of men it employs and the size of its pay roll, the apparent object being to discourage jitney patronage.

Southern Cities Investigate.

In several southern cities an effort has been made to secure facts concerning the operation of jitneys by the street railway companies, who have checked the 'busses and the number of passengers carried by them on various routes. In Houston, Tex., where most of the business is in a two-mile zone and only one or two lines are more than three miles long, the effect of the jitney on the railway company has been especially unprofitable. Some of these street railways after checking up results reported, without the name of the city being given, that the gross daily income per jitney is only \$2.27.

In Waltham, Mass., an ordinance has been proposed forbidding a jitney to operate over the tracks of the street railway company. This, it is said, will be interpreted, if passed, to mean that the 'busses cannot cross the car tracks and will, of course, end their operation at once.

In Pawtucket, R. I., the jitney men recently met and planned a strong fight against regulation by the city council, which is expected to be modelled after that of Providence, with perhaps some features that are more severe. It is said that the jitneys will not be admitted to the parks and that all smoking in them will be prohibited.

Will Fight in the Courts.

The Providence jitney men have been raising a fund to fight the ordinance recently passed in that city for their regulation. An injunction against the enforcement of the law is to be asked, and an effort will be made to permanently prevent its enforcement.

The Connecticut Company, a trolley subsidiary of the New York, New Haven & Hartford railroad, reports a loss of gross income for April, 1915, amounting to \$40,753, as compared to last year. This came in the face of steadily increasing business until April, when the 'busses began to operate.

In Vancouver, B. C., jitney competition has forced a reduction in street railway fares. Eight tickets for 25 cents are now sold instead of the straight five-cent fare, which formerly prevailed. Transfers are not issued on the new tickets, however.

Although a new state law was recently passed on the subject, the common council of Hartford, Conn., is preparing a jitney ordinance which will require a license of \$10 for each jitney carrying

five passengers, and \$2 for each additional seat. Carrying capacity will be restricted to two passengers more than the car's seating capacity. A \$2 license fee for the driver will also be required. This is much less severe than the new Providence ordinance.

A company has been organized in Marlboro, Mass., which will be known as the Marlboro 'Bus Company, and will operate between Marlboro and Hudson. The company is under the management of H. H. McGlauffin of Watertown. 'Busses to carry 14 people will be mounted on Cadillac passenger car chassis and a 15-minute schedule will be maintained between the two towns. Summer afternoons and evenings 'busses may also be operated to nearby resorts. The 'busses will continue their service in the winter and will be heated.

The existing motor transportation companies of New York City will have stern competition if franchises are granted to the new concerns bidding for the privileges.

Three bids in all were received. The Fifth Avenue Coach Company, which operates a 'bus line at present, offered a straight 10-cent fare proposal similar to the arrangement under which it operates now. An almost similar bid was offered by the New York Motor 'Bus Company.

Offers Three-Cent Fares.

A new concern, not yet organized, but represented by O. C. Brunner and W. T. Ridley of 405 Pearl street, made an offer, with the necessary bonds attached, to run a line with three-cent fares in certain zones, and a total fare of nine cents on some of the longer runs.

Five per cent. of the gross receipts are offered to the city for the first five years and 7½ per cent. for the second five years, and 10 per cent. for the third five years. The company would operate in three zones, with a fare of three cents in each zone. They agree to operate on a five-minute headway in busy hours and a 10-minute headway at other times.

The Fifth Avenue Coach Company offered five per cent. of its gross receipts to the city. It made an alternative proposal that the net profit from the routes be divided in the way in which the new subways will be operated. The New York Motor 'Bus Company bid five per cent. of its receipts and promised to have 100 'busses running in six months. It desires to operate cross town lines, one of which would take passengers from the Pennsylvania station to important points about the city, charging a five-cent fare for each person.

CRUISE MEETING OF THE S. A. E.

FOUR HUNDRED members of the Society of Automobile Engineers took part in the summer cruise of the organization through Georgian bay on the steamer Noronic, June 16, and the meeting, which is the third that has been held on ship board, was so successful that it was decided to make the cruise a permanent annual feature of the programme.

Multiple cylinder motors were one of the chief subjects of discussion at the meetings. Many of the leading engineers of the industry took part in the debate and many diverse opinions were expressed. It became evident that a great deal of experimenting with eight and 12-cylinder motors has been done by a number of companies. Several more eights and 12's are to be announced in the near future.

Many well known engineers expressed the opinion that the ultimate car would be a four. This type has always been a great favorite with engineers because of its greater simplicity and its staying power as demonstrated in successful racing cars, nearly all of which are fours.

Capt. J. S. Critchley, an English engineer, who has been in America several months in connection with the purchase of military supplies for the allies, declared that the American situation at present was similar to that in England when many makers turned from the four to the six. While the six itself was an important development, he said that the greatest effect of the movement had been in improving the four.

Many of the engineers agreed that the high standards of accuracy required to produce eight and 12-cylinder motors ought to have a beneficial effect in pulling up standards for the four, and that methods would be worked out which ought also to reduce cost of manufacture for that type of motor.

The discussion of high-speed multiple cylinder designs followed a paper by A. P. Brush on "Fundamental Problems of Engine Design." C. T. Myers warmly espoused the cause of the four-cylinder and among the men who talked on the

subject were Marmon, Dunham, Coffin, C. W. McKinley, D. McCall White and Russell Huff.

Many shades of opinion were disclosed. Fours, sixes, eights and 12's all have supporters, and the engineers who have produced eights and 12's ardently supported those new types. It seemed to be agreed that their smoothness of operation and steady power was very attractive, but many held that granted equal refinement in all the various types the differences in that respect might not be so great as to compensate for the additional complication and expense. This latter opinion was expressed by engineers who re-



William H. Van Dervoort, President of the S. A. E., and His Wife, in Conversation with a Fellow Passenger on the Noronic.

garded the additional cylinders as a "luxury" feature like 18-inch upholstery.

W. F. Hearst, speaking about clutch development, described recent improvements tending toward smooth and easy engagement of clutches, which is always desirable and especially so in cars that are to be operated by women. Varying views as to proper pedal pressures and differences in the co-efficients of friction in the clutch linings supplied by various manufacturers caused most of the difficulties of the designer, he said.

Speaking on "Spiral Bevel Gears for Automobile Drives," A. L. Stewart said that one of the noticeable recent tendencies was the reduction of rear axle ratios. The proper shape of the spiral tooth form took up most of the discussion. That a great improvement in smoothness and silence

of the drive is obtained by a properly designed spiral gear was agreed by those who touched on the subject. The applicability of the worm gear for this purpose was also much discussed.

Problems of current interest which received much attention were aluminum pistons, springs, pressed steel wheels and truck trailers.

A discussion of farm tractors which opened the eyes of the engineers to the magnitude of this market if it should ever be successfully developed, was given by Philip S. Rose. He said that American farmers now had about three billion dollars invested in animal power for the operation of their farms. This, he said, amounted to \$6 per acre of farm land. The first cost represents an investment of \$214 per horsepower, and annual maintenance amounts to \$107 per horsepower. Although the development of mechanical substitutes is admittedly a problem of



Russell Huff, Member of the S. A. E. **Howard Marmon, Past President S. A. E.**

very great difficulty, the enormous extent of the market is tempting many manufacturers into it.

A paper on methods of testing and preparing lubricating oil by C. W. Stratford, which gave the results of a long investigation by an oil manufacturer, was the first of importance on this subject that the engineers have had. It pointed the way to a very large saving in yearly maintenance cost.

"The Size and Inflation of Pneumatic Tires," was discussed in detail by P. W. Litchfield of the Goodyear Tire & Rubber Company. New standards presented for acceptance by the various divisions of the standards committee were received and will be voted upon by mail by all the members of the organization. They include recommendations on carburetor fittings, electrical equipment, electric vehicles, iron and steel, miscellaneous and springs.

Fog made the Noronic late in reaching its Georgian bay destination, so the picnic to Point

Au Baril had to be omitted and the trip to Detroit was made direct from Perry Sound. The crowd was so large that the single light draft steamer Waubic, which had been provided, could not accommodate all the members on the trip through the 30,000 islands. The small steamer Island Queen was chartered in addition and turned over to the metropolitan section for the cruise. The party paraded through the streets of Midland with the New York engineers, arrayed in their white butchers' coats and caps.

Amateur theatrical entertainments took up an evening on board ship. The New York section presented a piece called "The Sad Mystery of the Wiggle Drive," in which figured a detective and a fake buyer for a military power, who proved to be instead an emissary of the "Simpkins-Detroit Exile Company."

The Detroit section gave a full-fledged minstrel show.

In spite of the fact that a great many members dropped out of the organization last fall, owing to hard times, the membership this year was reported to be as large as it was last. Its financial condition is excellent.

The Detroit section undertook to take up with the executive side of the industry a proposition that the S. A. E. be given greater support. The erection of a new S. A. E. building in Detroit to house the activities of the organization was also discussed.

There are 175 members living in or near Chicago, and it was decided to organize a local section there. The fall meeting of the standards committee will be held there and the section is to be organized at that time. The winter meeting will be held as usual during the week of the New York show, but it will last for only one day this year.

The increase in the number of motor cars manufactured every year in the United States to nearly 500,000 has made it practically impossible to secure a sufficient amount of high-grade leather with which to make the upholstery.

Instead of using an imitation leather, many manufacturers are already using a high-grade water proof cloth, which they find to be superior even to the best of leather. This cloth is the result of experiments undertaken two or three years ago by the textile manufacturers at the request of the automobile makers. The cloth has no surface finish in which oil is used and which may come off in hot weather and spot the clothing of passengers.

GREAT PROGRESS AT SHEEPSHEAD BAY.

NEW YORK CITY'S motor speedway, at Sheepshead Bay, is rapidly being put into shape and the plans for the opening event on Oct. 2 are as rapidly materializing. Entry blanks for the racing drivers are already prepared, and the management is predicting that the mammoth racing plant will be ready for practise spins by Sept. 1.

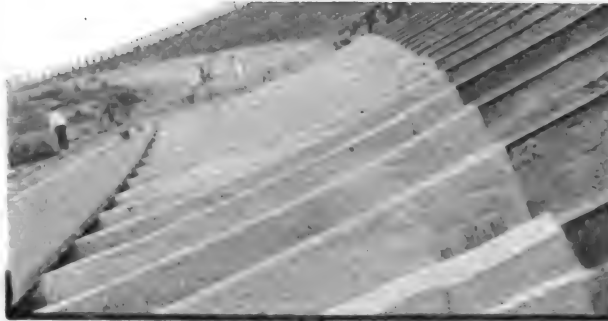
The construction force has been augmented frequently, until there were 2000 workmen engaged, including the 500 carpenters who are laying the wooden surface of the track. About two miles of concrete sleepers are in place and the setting up of all the steel for the course is nearing completion.

Protection for patrons is assured by stout walls, fences and wires. For protection

for the Sheepshead Bay course, with its curved turns and higher banks, to produce at least a 120-mile rate in the elimination trials. With the building up of these board speedways, motor racing has entered on a new era. Cars will soon be built that will show 135 or 140-mile averages."

The distance of the race on Oct. 2 will be 350 miles, which the management feels certain will prove more exciting and more of a real test than would a 500-mile contest. It was pointed out that sometimes in the 500-mile events the contest is practically over at the 300-mile mark, barring accidents, and in many cases the field of starters has been cut in half at this stage of the race.

A far higher rate of speed is expected by the drivers cutting loose at top speed without hold-



Views of the Sheepshead Bay Automobile Race Course in Process of Construction, Showing Details of the Immense Plant—Group of Officials and Press Representatives During Recent Inspection of the Course.

of drivers Manager Everard Thompson and Engineer Blaine H. Miller have decided to have the concrete retaining wall at the turns moved to a distance of 75 feet from the edge of the track. The intervening ground will be sodded, so in the case of accident the cars will not only be slowed down before hitting the barrier, if at all, but also be prevented from being thrown on the track in the path of following racers.

A rate of 120 miles an hour before the close of this racing season, and possibly 140 miles in the not distant future, were the prophesies made by motoring experts after an investigation of the track. "With Chicago's track already proved to be good for more than 110 miles an hour," said David Beecraft, A. A. A. racing expert, "I look

ing back through fear of tire trouble or mechanical weaknesses being developed in the last 150 miles. Then again a 350-mile race will assure the victor crossing the finishing line inside of four hours, with all the other prize money winners finishing within half an hour after that, so that all the spectators will have an opportunity to see the finish and yet have ample time to get back to Manhattan in time for dinner or the outgoing afternoon trains.

The Arizona state fair commission has guaranteed a purse of \$5000 for a 150-mile race to be run over a mile oval dirt track Nov. 18. G. P. Bullard, superintendent of the race, hopes to arrange road races from Los Angeles to Phoenix.

NEW LAWS AND COURT RULINGS.

NEW codes of motor laws have just gone into effect in Washington, Utah. The Washington law, replacing all former legislation on the subject, went into effect June 10. It puts the enforcement of the law largely in the hands of the secretary of state, acting through the county auditors for the collection of taxes.

The law provides, among other things, that no one under 15 years of age may operate a car unless accompanied by an older person. Applications for licenses are made to the county auditor, who furnishes a temporary number on cardboard for use until the permanent number can be secured from the secretary of state.

No license can be transferred from one person to another, but it can be transferred from one vehicle to another. Exemption of 90 days is granted to motorists from other states. A sale of a motor car is not recognized until the original owner's number plates have been removed and the new owner has secured a license.

Fees are \$3 for 25 horsepower or under; 25 to 40, \$5; and over 40, \$7.50. Automobiles for hire are licensed at the rate of 50 cents per horsepower; trucks up to two tons, \$10; two to three tons, \$15; three to four tons, \$20; four to five tons, \$25. On motor trucks operated for hire these rates are doubled. Automobile stages are taxed 50 cents per horsepower. A section covering jitneys provides for a bond of \$2500 for that service.

The new Utah law provides for annual registration instead of perpetual. Fees are \$10 for electric pleasure vehicles; \$10 for commercial vehicles used for carrying passengers for hire; \$10 for trucks; \$5 for cars up to 25 horsepower; \$10 for cars of from 25 to 40 horsepower, and \$15 for cars above 40 horsepower. Chauffeurs are licensed at \$2 per year and are supplied with badges.

In Oregon the motor law licenses the vehicle and not the owner, and the license stays with the car for a year, no matter how often it changes hands. In case it is sold the new owner may secure a transfer of the license for \$1.

New Jersey's new law prohibiting bright lights on the highways goes into effect July 1. Commissioner Dill of the Department of Motor Vehicles has instructed the police to begin enforcement of the law at that time.

The United States supreme court has upheld the Florida law, which fixes a license tax of \$3 on each car and then permits additional local

taxation. Automobile owners contended that this was double taxation and fought the matter in the courts.

Following the death of a child who was run over by an automobile driven by a 14-year-old boy, the coroner at Pittsburg issued a warning that parents were responsible for any accidents in which their cars figured if driven by minors and declared that action would be taken against parents who allowed children under 16 to drive.

A hearing of the petition of certain Savannah automobile owners who ask a permanent injunction to prohibit the state from enforcing its new motor tax law was held June 12. Attorney-General Grice, at the request of the city attorney of Savannah, assisted in defending the case, which was heard by Judge Charlton of the superior court of Bibb county. Previous rulings of the supreme court have upheld the law and state officials are confident that the present attack will have a similar result.

Illinois cities, with the exception of Freeport, have refused to apply for automobile licenses for the motor apparatus used in their fire and police departments. They declare that the motors are public property and that it is illogical to tax them as private cars are taxed. The state has made no effort to enforce the license law where they are concerned.

Tax assessors of Cuyahoga county, Ohio, in which Cleveland is situated, have announced a new basis for taxing motor cars. The changes were suggested by the Cleveland Automobile Club. New cars are to be appraised at full list price; 1915 models in use prior to April 1, 90 per cent. of list price; 1915 models in use prior to Jan. 1, 1915, 80 per cent. of list price; 1914 models, 50 per cent. of list price; 1913 models, 40 per cent.; 1912, 30 per cent.; 1911, 20 per cent.; 1910 and prior thereto, 10 per cent.

The Ohio State Highway Commission has agreed to spend \$35,000 in improving the Maumee river boulevard, between Rossford and Perrysburg. This is the key to an elaborate plan for a 33-mile driveway around the city. The state fund, with \$15,000 to be raised by public subscription, will improve 3.65 miles of bad road and connect up long stretches of the route already improved. The road will reach the site of Fort Meigs, Fort Miami and Dudley's battleground, the scene of the battle of Fallen Timbers, and Turkeyfoot rock.

TRUCK EFFICIENCY IN ROAD BUILDING.

ROAD building at a speed and a low cost that was undreamed of a few years ago has been accomplished by Louis Martine, a road contractor, working on macadam construction in La Porte county, Indiana. Two special White good road trucks did the work of 72 horses in hauling material, and took the place of a traction engine in grading, scarifying and rolling the roads.

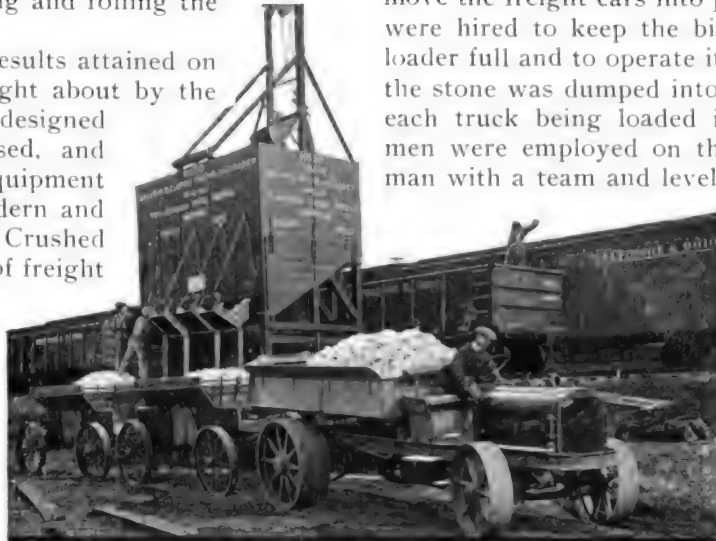
The remarkable results attained on this job were brought about by the fact that specially designed road trucks were used, and that all the other equipment was of the most modern and up-to-date type. Crushed stone was taken out of freight cars by an Eclipse unloader, hauled a mile, spread and rolled at a cost of $13\frac{1}{2}$ cents a yard.

The trucks were a special type, with power dumping bodies, very wide steel cambered wheels and an adjustable tail gate in

broad gauge wheels of the truck, running over the surface constantly, rolled the road at the same time.

On the second day the laying of the crushed stone was begun. It arrived in freight cars at a siding a half mile from the beginning of the new road. One man with a team was employed to move the freight cars into position, and four men were hired to keep the bins of the Eclipse unloader full and to operate it. From this unloader the stone was dumped into the trucks by chutes, each truck being loaded in one minute. Four men were employed on the road—a foreman, a man with a team and leveller and two rakers.

Beginning at the end nearest to the unloaders the White trucks hauled and spread five yards of crushed stone at each trip. The tail gate of the trucks is so designed that the opening can be made any desirable width and it is built



Operations of White Good Roads Truck—Top View, Showing Trucks Being Loaded at Railroad by Eclipse Unloader—Left, Shows Elimination of Roller by Hauling Over Stone Already Laid; Right, Train Consisting of Five-Yard Truck and Two Trailers of Three Yards Capacity Each.

the body, which could be held open at any desired width, and the load dumped as the truck moved, so that it spread the material automatically.

Ten miles northwest of La Porte, a country road, $1\frac{1}{2}$ miles long, with much clay and sand in it, was rebuilt with macadam. With the two trucks used to pull graders, levellers and other road machinery, the entire length of this stretch was widened, graded and levelled in one day. The

with a tripping device operated from driver's seat. As the body was elevated by the dumping mechanism and the tail gate set for spreading the material at the desired width, the truck moved forward. This spread the rock so evenly that almost no raking was required after the truck had passed.

The road was built 10 feet wide, with 10 inches of coarse stone and two inches of screenings. As each new load was brought to the job

the trucks drove over the load that had been previously spread and the constant running on the stone crushed it down, so that no further rolling was necessary before the top dressing was laid on. In the same manner the top dressing was pressed home and bound. After 11 hours work one-half mile of the road was finished macadam.

Because of the greater distance from the cars to the work, two three-yard trailers were attached to one of the trucks, making the capacity of the train 11 yards. The truck and trailers were loaded in a little more than two minutes. The one-mile haul over which the trucks now worked was nearly all up grade.

It would have been impossible for a team to haul more than $1\frac{1}{4}$ yards over the same haul and the trip would have required an hour. Extra

One man and team (to move freight cars)	\$2.32
Three men shovelling into unloader.....	7.42½
One man operating unloader.....	3.00
264 yards unloaded at cost of.....	\$12.74
Cost of unloading per yard.....	.0482
Two truck drivers at \$3.50 per day.....	7.00
Gasoline	4.75
Oil	1.12
264 yards hauled, dumped and spread..	12.87
Cost of hauling dumping and spreading per yard.....	.0487
Man with team and leveller.....	2.25
Foreman	3.00
Two rakers	5.00
264 yards worked at cost of.....	10.25
Cost of working per yard.....	.0389
Total cost of unloading, hauling, dumping, spreading, levelling, raking and rolling	\$35.86
Total cost per yard.....	.135



White Goods Roads Truck, Owned by Louis Martine, LaPorte, Ind., Spreading Stone.

teams to help out of bad holes might have been necessary. It would have required 36 teams to have done the work of each of the trucks, and it would not have been at the same time, spread and rolled. The cost of 72 horses and 36 drivers, not to mention the men needed to spread the rock, and the steam roller to press it down, would have been very much greater.

Instead of closing the road for six or seven weeks, as is often necessary for such jobs, it was kept open all the time and the entire job was finished in a very few days.

The cost statement, by which the contractor arrived at $13\frac{1}{2}$ cents as the cost of placing and rolling the rock per yard, is presented in the following:

The half-mile over the unimproved road was sandy and muddy in places, but the wide wheels of the trucks packed it down and made it passable. Under favorable conditions the truck with trailers made the run, dumped its own load and pulled the trailers in position to be unloaded, in 30 minutes.

It should be explained in relation to the charge of \$2.32 for a man and team moving freight cars and \$2.25 for man and team using leveller, that these figures represent fractional days work, the remainder of time being applied to other jobs.

One of the largest factors in the economy and facility with which the road was built was the Eclipse Unloader, built by the Galion Iron Works and Manufacturing Company, Galion, O. This equipment possesses several features of value, one of which is that it is portable and can be set up in a comparatively short time beside the railroad cars.

In the transfer of material it requires the services of only one man to operate the mechanism by which the material is hoisted from the ground to the bin, from which it descends to the trucks by gravity through one or all of the chutes.

Another feature of the economy is that the driver of the truck can do all the work necessary in trimming the load and can operate the gates which control the flow from the bin.

PRACTICAL MOTOR CAR REPAIRS.

A WINDSHIELD plate of glass that is cracked or slightly broken may be repaired in the following manner: Place a piece of leather

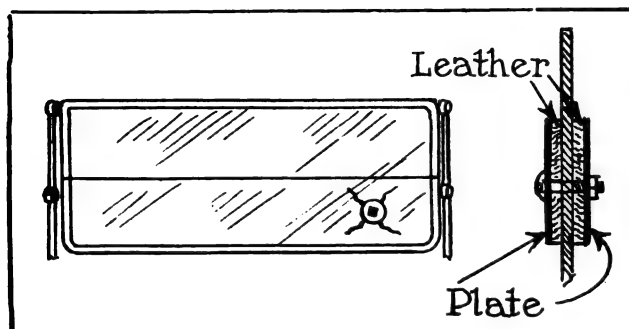


Fig. 58—Method of Repairing Cracked Windshield by Bolting Pads Against Edges of Hole.

on either side of the hole and attach metal plates on the outside, as shown in Fig. 58. A small hole is then drilled through the plates and leather to admit a small bolt. When this bolt is tightened it will hold the glass firm and secure and the windshield will be as serviceable as before, and the repair will endure for a long period of time.

HOME-MADE EXHAUST CUT-OUT.

A serviceable exhaust cut-out can be made from an old T pipe coupling by the mechanically inclined motorist. The operation is illustrated at Fig. 59 II. Drill a $\frac{3}{8}$ -inch hole in the centre, as shown at B. By enlarging the large side opening (C) in the coupling in a lathe, it can be converted into a valve seat. The valve (D) should also be shaped in the lathe to fit the seat, and be drilled and tapped to take a $\frac{3}{8}$ -inch rod, which should be of sufficient length to pass through the foot board and threaded on both ends, as shown at E. After screwing one end into the valve disc, make secure with a locking nut (F). Mount an open coil spring (G), securing it by washer and cotter pin in a hole drilled in the rod (H) at a point where the spring will produce sufficient pressure to keep the valve firmly seated. I represents a round-headed nut, to be screwed on top of the rod for operation with the foot.

Pressure upon the knob opens the valve and permits the exhaust to escape.

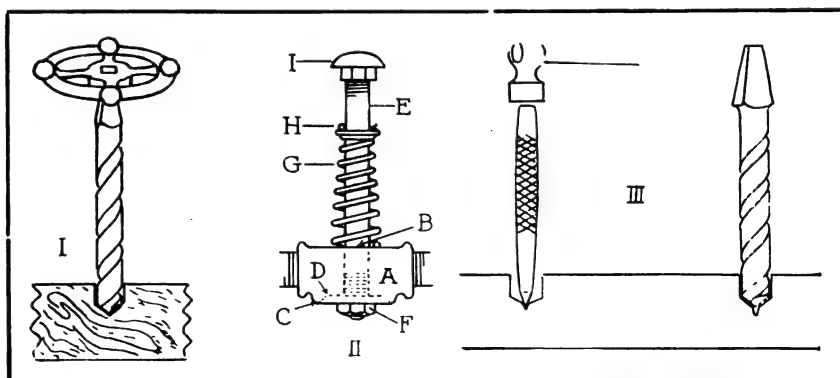


Fig. 59—I, Turning Bit with Valve Wheel; II, Home-Made Exhaust Cut-Out; III, Drilling Metal by Hand.

DRILLING HOLES IN METAL BY HAND.

Drilling holes in metal with a breast drill is by no means an easy task, especially if the hole is to be of considerable depth. The chief difficulty is to exert enough pressure to make the point of the drill bite into the metal.

Experienced mechanics give the initial start by sinking a sharp centre punch into the metal where the hole is to be, and then using the drill to the depth of punch mark. Again they use the punch, and again the drill, and by this means they can drill a hole in about half the time required by ordinary means. With a good, sharp punch a hole an eighth of an inch deep can be made. See Fig. 59 III.

TURNING BIT WITH VALVE WHEEL.

To afford easy accessibility to parts of an automobile that are ordinarily inaccessible, particularly for the purpose of drilling, the suggestion herewith illustrated will be found practicable. File a square hole in an old valve wheel, as shown in Fig. 59 I, until it fits the tapered shank of the drill. Sufficient leverage can thus be secured to drill through very thick board or reasonably thick metal. An advantage of this home-made tool is that it can be made a permanent and valuable adjunct to the tool outfit.

METHODS OF LOCKING NUTS.

The constant vibratory stresses on an automobile will loosen any nut if it is not made secure. There are many means by which a nut can be locked. The cheapest and simplest method

is to insert a spring washer under it as shown in Fig. 60 A. This kind of washer tends to keep a tension on the nut and prevents it turning. An-

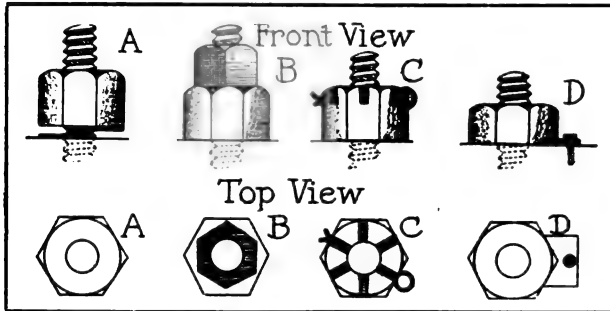


Fig. 60—A, Spring Washer; B, Ordinary Use of Check Nut; C, Castellated Nut Secured by Pin; D, Nut Clamped to Prevent Turning.

other simple way is by using a second nut, as shown in Fig. 60 B. There is an important fact that should be borne in mind when using this method, and that is that the first nut should be screwed down as tightly as possible. The second nut should then be screwed on until it slightly touches the first.

Now the second nut should be held stationary with a wrench and the first nut screwed back hard against it. If this is not done and the nuts are both screwed down tightly, the top nut will work loose and the lower one will follow. Frequently nuts have slots that are milled at right angles on the top. When this kind of nut is used the stud should be drilled so that a split pin can be inserted through the slot and hole. This is illustrated in Fig. 60 C. Still another method of securing a nut is by taking a piece of sheet metal and cutting a "V" in it. The "V" is fitted to the corner of the nut and made secure by a machine screw attaching it to the surrounding material. This method is illustrated in Fig. 60 D.

WOBBLING OF FRONT WHEELS.

One of the greatest causes of tire wear and hard steering is due to the wobbling of the front wheels. Whenever this condition exists it should be promptly remedied. To determine whether the fault lies in the roller bearing or king pin, the front wheels should be jacked and an attempt made to rock them by gripping at top and bottom. When the bearing is found to be at fault, adjustment can be made by tightening the retaining nut on the wheel axle, thus forcing the roller bearing into closer contact with the wheel.

Many times it will be necessary to insert thin shims behind the nut so that the desired play may be taken up. In making this adjustment

care should be taken not to have the bearing too tight, but just enough so that the wheel will spin freely. If it is found that the king pin is loose, the fault will generally be located in the bushings. These should be driven out and new ones fitted. If the king pin is found to be worn this also must be replaced with a new one.

HANDY HOME-MADE JACK.

Much time is lost in garages and repair shops where cars are continually jacked so that adjustments can be made. Many times a jack is not convenient, or all are in use. A practical home-made jack which will always be handy and serviceable is shown in Fig. 61. This should be made of pine timber. The horse should be about 18 inches high and the lever arm may be as long as desired. Place the small end of the lever under the axle and by applying the weight onto the long end a car or truck will be easily lifted. If there is need of keeping the wheel off the ground or floor, a small horse, as shown in Fig. 61, may be pushed under it.

FITTING PISTON RINGS.

If the piston rings in the cylinder are not well fitted the compression will be low, the power of the explosion will be reduced, gasoline will be consumed without producing power, and the serviceability of the car greatly lessened. Carbon will accumulate on the spark plugs and cylinder heads, from the oil working by the rings and into the combustion chamber, often causing preignition and overheating.

Piston rings lose elasticity from wear or heating and when warped the hot gas from the explosion will pass them. Inspection of the rings will best determine if the gas is escaping. If the fit is good the ring will be polished its entire circumference, but points of leakage will be discol-

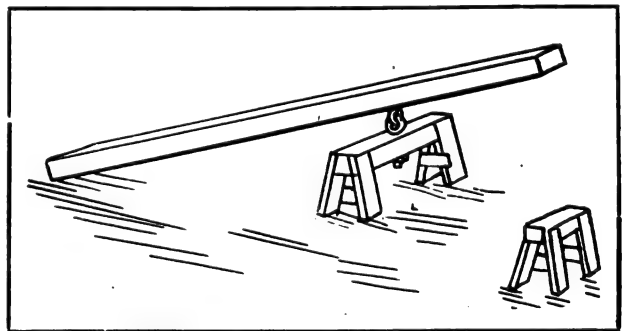


Fig. 61—Improved Jack of Large Capacity for Use in Raising Large Machines.

ored. If the leakage is for a considerable part of the circumference of the ring it may be used again if a strip of thin metal is placed back of it

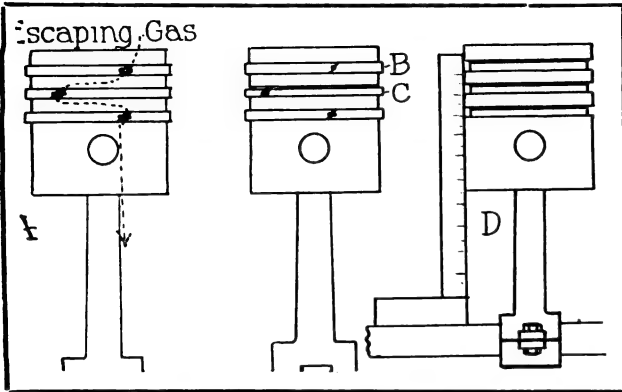


Fig. 62—A, Gas Escaping Past Wide Piston Ring Slots; B, Well Fitted Piston Ring; C, Poor Fitting Piston Ring; D, Method of Aligning Piston on Mandrel.

in the channel of the piston, which will slightly increase its diameter when in the cylinder. It should be understood that the metal strip is placed only behind that section which had not contacted perfectly. If the ring has lost its elasticity, as well as fitting poorly, it had best be discarded.

When fitting a new ring it is sometimes advisable to grind it to the cylinder. The cylinder wall is coated with a mixture of machine oil and ground glass, and the piston with ring in place worked back and forth. Care should be taken that the gap in the ring is not too large, for this will allow gas to escape, as shown in Fig. 62 A. A close fit will give better results than if the ring were forced into the cylinder. The perfect fit of a ring is necessary, and if the owner is uncertain of his judgment he should seek the assistance of an experienced man. The ring channels should be carefully cleaned before the rings are fitted and plenty of oil should be placed on the rings and cylinder wall.

With care the rings can be expanded sufficiently to pass over the head of the cylinder and into the grooves. When a ring must pass over another groove this can best be done by placing thin metal strips between the piston and the ring. The rings can then be slipped over the strips and into their channels. An example of a good fitting ring is illustrated in Fig. 62 B, and a poorly fitted ring is shown in Fig. 62 C.

REMOVING NICKEL FROM BRASS.

In removing nickel from brass it is necessary to either use acid or scrape it off mechanically. The first method is most desired, because it

leaves a smooth foundation. Mix equal parts of nitric and sulphuric acid and apply with a brush. The solution will rapidly eat away the nickel, leaving the brass visible. Wash thoroughly and repolish. If possible, have the parts rebuffered which affords an excellent finish.

QUIETING OVERHEAD VALVES.

There are many methods by which overhead valves may be silenced, some of which are replacing the worn parts with new, inserting fibre washers on the plungers, etc. These repairs are advisable when the parts can be readily procured, but in case they cannot, the valves can be easily made less noisy by the use of small springs. One end of the spring should be fastened around the rocker arm, as shown in Fig. 63, and the other end may be secured to any convenient object. It may be necessary to make an extension of a piece of wire so as to attach the lower end of the spring, as is also shown in the sketch. When the spring is properly placed it will eliminate all the noise that was caused by the valves.

EMERGENCY CONNECTING ROD REPAIR.

Usually when a connecting rod bearing breaks or burns out, the car must be drawn home by a tow rope. Usually the lower half of the bearing breaks, as it is the part subjected to the most strain. When such a condition happens a temporary repair that will obviate towing may be made as follows: Loosen the rod from the crankshaft and scrape out the broken bearing. Then take a strip of leather and place it in the bearing bushing. If no heavy leather is obtainable, a belt can be cut and doubled and used with good results. Then screw the bearing back to the shaft, and by using a liberal supply of oil

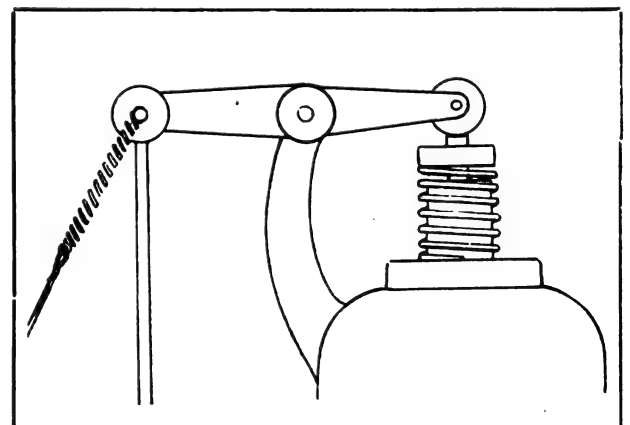


Fig. 63—Silencing Overhead Valve by Applying Tension to Rocker Arm.

the leather will serve as a satisfactory substitute for the bearing for a goodly number of miles. The repair as made is shown in Fig. 64.

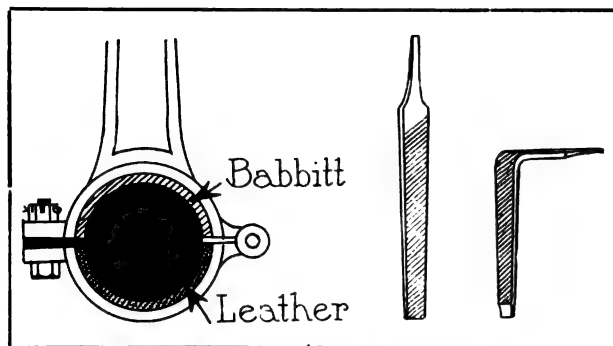


Fig. 64—Connecting Rod Babbitt Replaced by Leather Packing and Screw Driver for Heavy Work Made from Large File.

This is only a temporary repair, and the bearing should be replaced immediately.

SCREW DRIVER FOR HEAVY WORK.

A screw driver that will be especially useful in heavy work can be made from an ordinary flat file. The file should first be placed in a fire and heated to a red and allowed to cool. Next it should be heated in the centre and placed in a vise and bent as is shown in Fig. 64. A screw driver of this type is very useful in removing inaccessible screws and also when great pressure is needed, as a monkey wrench or piece of tubing may be used in connection with it for greater leverage.

STICKING MULTIPLE DISC CLUTCHES.

With many trucks that have multiple disc clutches, difficulty is sometimes experienced in changing the gears. There are many causes for noise when gear shifting, but one of the most common is the "sticking of the clutch." A multiple disc clutch is usually built of steel discs, which are alternately faced with asbestos or some anti-friction material. Grease or oil from the transmission gearset or universal joint may work out on to these plates and will cause them to stick to each other. When the clutch is engaged a large spiral spring holds these discs against each other and against the engine flywheel. When the clutch is disengaged the tension is taken off these discs by releasing the spring. The plates should disengage themselves and the separation will stop the clutch shaft.

If these discs do not disengage the clutch shaft will not idle itself and will therefore make

gear shifting noisy and difficult. This type of clutch is usually provided with a small hole for applying oil to these plates. When the plates are sticking a quantity of kerosene should be squirted through this hole and the clutch pedal worked back and forth. This should then be followed with a solution of equal parts of machine oil and kerosene. Do not apply the machine oil without the kerosene, as it will cause the plates to slip. The solution of machine oil and kerosene is used because the kerosene alone would cause the plates to take hold with a grabbing effect, while with oil mixed with it the plates will engage easily.

CHAINING A STARTING CRANK.

Many means may be used to prevent an automobile being started except by the owner himself. Some of these are well conceived inventions, while others are adaptations of what are in expensive materials that are available to all. One owner has found ample protection in a small steel chain and a snap lock. In utilizing this he pushes the cranking handle into mesh with the crankshaft and secures it in that position by a chain wrapped around the handle and the front axle, as shown in Fig. 65. This will securely lock the machine and it cannot be started without attracting much attention, even if one rear wheel is jacked and the high gear placed in mesh, as the crankshaft in motion will ratchet against the crank handle and cause a loud rattle.

When new connecting rod bearings are adjusted they must not only fit the surface of the crankshaft, but the alignment between the piston and the cylinder must be correct. If the piston is not in a direct line with the cylinder there will be uneven pressure on the wall. This will cause wear on both the cylinder and the rings.

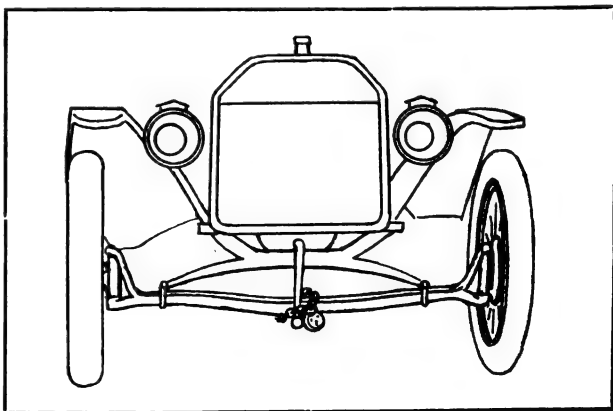


Fig. 65—Starting Crank Chained to Front Axle to Prevent Theft or Use.

FRENCH MOTOR STERILIZING PLANT.

A MOTOR truck carrying apparatus for the sterilization of water and the production of ozone has been added recently to the equip-



French Army Motor Plant for Sterilizing Water.

ment of the French army. Electrical apparatus is supplied which will do the work rapidly at the field hospitals.

The chassis is a 35-horsepower Schneider of the type that has been used for Paris omnibus work, and the body work is a simple enclosed compartment in which the apparatus is installed. On each side of the car are wooden frames, which can be pulled down horizontally, and which serve to support two canvas tanks of large capacity. These tanks fold up readily and when so folded take up minimum space. Water to be sterilized is drawn into one of the tanks by a small, electrically operated pump. The first tank is connected with the second on the opposite side of the car by piping.

The electrical equipment consists of a dynamo operated by the truck engine. The current goes through a transformer and is raised to a very high voltage, capable of producing the emanations which in turn produce ozone by their action on the oxygen of the air. The emanations are produced between two non-conducting plates, the exteriors of which are charged at different voltages. The temperature of the plates, which are of glass, goes up rapidly, so that a cooling system, consisting of metal jackets, filled with water and placed over the glass, is necessary.

This water serves at the same time as conductor for the current. One of the metallic plates is attached to a ground wire and the other to the high-tension circuit. The air is drawn by a mixing apparatus into the glass container, where the electrical emanations work upon it and create the ozone.

Ozone is brought into contact with the water passing between the two tanks in two opposed cones. The natural water comes into the upper cone and trickles down through the lower one. There is a little space between the two cones and during its rapid passage of this space the ozone is absorbed by the water. This sterilizes it very quickly. When it reaches a basin at the bottom of the car the ozone bubbles out of it again, leaving it pure and suitable for drinking purposes.

The apparatus will treat five cubic meters of water per hour. It is used in places where water is known to have been contaminated. Other installations of the same sort will probably be completed before hot weather makes greater the necessity for purifying water.

In order to treat wounded men as promptly



One of the Two Canvas Water Tanks of the French Water Sterilizing Plant, and a View Showing Electrical Installation in the Truck.

as possible and get the utmost use from its motor ambulance fleet, by shortening the run, the French army has organized motor surgical convoys, operating at from 20 to 25 kilometers an hour, which are established at a distance of 20 kilometers behind the front at any point where fighting has been in progress.

Each unit is composed of nine motor vehicles, six of which carry the hospital personnel and materials. The seventh is equipped with X-ray apparatus. The eighth carries a steam generator and an apparatus for heating water in quantity, and the ninth is fitted up as a pharmacy.

The hospital tent of three rooms can be erected in half an hour. In the first room the wounded are washed. In the second they rest. In the third there are four operating tables. The hot water plant is placed close to this last. When the motor vehicles are standing still their engines are used to run dynamos to light the hospital.

TRUCK PURCHASES INVESTIGATED.

A parliamentary committee in Canada has been investigating the purchase of motor trucks by the Canadian government, which were to be used by the Canadian contingent on the continent.

This investigation revolved about the production of a receipt by the examining committee, signed by Maj. J. H. McQuarrie for \$1200 "for my influence with Col. Sam Hughes, minister of the Department of Militia and Defense." The receipt was made out to a Canadian dealer in American trucks, who later sold 23 of the machines to the Canadian government.

The major admitted that he had written the receipt and received the money, but denied that he had used the influence. This was a strictly Canadian transaction, as the dealer admitted that the payment was made out of his commission on the trucks and the American manufacturer knew nothing of the matter.

DAIRY TRUCKS USED IN AUSTRALIA.

Collection of milk and cream by truck has been generally adopted by many Australian creameries and butter factories. It is necessary to remove the cream, separated from the milk at the farm by a mechanical separator, to the butter factory promptly if the best results are to be obtained.

When the farmer was left to deliver the cream

himself it often arrived in bad condition, or it arrived so irregularly that it was impossible to keep the force there busy all the time.

At first regular collections by horse drawn vehicles on the part of the factory were attempted and these developed into a system that was much more satisfactory than the previous ones had been.

When the motor truck developed its greater speed and wider range of operation it immediately commended itself to the factory managers and, notwithstanding the high cost of gasoline in the antipodes, it was given a trial which proved entirely satisfactory. The trucks are now run by several of the factories on a regular schedule and cover a large range of territory about the plant, at a very considerable reduction in expense as compared to other methods.

AMERICAN AMBULANCE SYSTEM USED.

There are now 80 American ambulances operating with the armies of the Allies in France and so efficient has been the service of some of these units that the French ambulance corps is planning to base its system on the methods worked out by the Americans. The American ambulance men have been asked to appear before a gathering of military physicians in Paris and give an account of their methods for the benefit of French stretcher bearers. Harvard is represented by 10 ambulances, a repair and a pilot car. There are 14 American volunteer ambulance drivers with the army, and 11 of them are Harvard graduates. A. Piatt Andrew, former assistant secretary of the treasury, and Dr. Edmund K. Gros, are in charge of the American division.

ARMY TRUCK DRIVERS SCARCE.

Early in the war England did not enlist truck drivers in excess of the number required to operate the trucks already in service on the ground that truck drivers of good training were plentiful and could be secured fully trained at any time.

Now that large levies of recently enlisted troops are going to the front there is a great demand for additional transport and all the really good drivers are already in service.

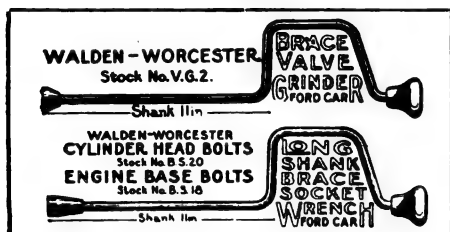
Great difficulty has arisen because of the time it takes to break in an entirely green man. This is another angle of the criticism of the English management of the war which has brought about the reorganization of the English cabinet.

CAR ACCESSORIES AND EQUIPMENT.

WALDEN HIGH-GRADE PRODUCTS.

Widely Known Manufacturer of Walden Wrenches Is Producing Accessories of Merit for Ford Cars.

The two accessories illustrated herewith are the product of the Walden Manufacturing Company, Worcester, Mass., which has established a national reputation as the



Two High-Grade Walden Products.

Versatility, endurance and convenience are some of the distinguishing features of the valve grinder. It has a shank 11 inches long, which enables the operator to stand upright while grinding and to use both hands in the operation.

The socket wrench is especially designed for cylinder heads and engine base bolts and has been found to be highly efficient and quick in service. This also has an 11-inch shank, which affords easy access to low sitting bolts.

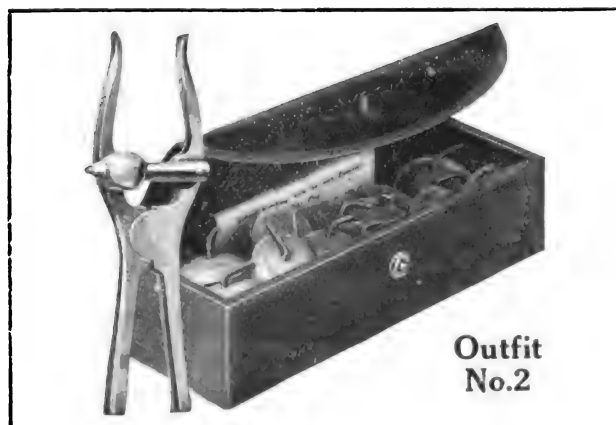
Both of these products maintain the high standard of construction and finish established in all other Walden products, and they are guaranteed fully to render long service. Each retails at 65 cents.

SAMPSON REPAIR KIT.

Permanent Repairs Made on Inner Tubes Without the Use of Any Cleaning Fluid, Cement or Patches.

The repair kit illustrated, known as the No. 2 Sampson outfit, is the product of the Stevens Company, 375 Broadway, New York City. It consists of 12 repair plugs and a special tool for rounding and distending the opening in the tube for the insertion of the plug.

One of the desirable features of the Sampson plug is that it makes unnecessary the use of cement or the application of cleaning fluids to the tube or the plug. It is made in two sections, which are drawn together by means of a threaded wire, and is broken off flush with the surface when the plug has been securely positioned.



Sampson No. 2 Repair Kit for Inner Tubes.

The edge of the plug cannot cut into the tube, as it is made of soft rubber and tapered. Permanent repair can be effected in about 1½ minutes.

The Sampson tool and plugs are packed in neat and serviceable containers and retail at \$2.50 a set. No. 1 set consists of a tool and six plugs, selling at \$1.50. Set No. 2, price \$1.50, is adapted for use on motorcycle tubes and includes six small plugs and the tool.

Dealers may obtain more detailed information regarding prices, discounts, selling campaigns, etc., by mentioning the Automobile Journal when writing to the company.

IMPROVED HARTFORD SHOCK ABSORBER.

New Hartford Shock Absorber Includes Several Distinctive Improvements.

Many of the desirable features of the Truffault-Hartford shock absorber, as well as several distinctive improvements, have been incorporated into the new Improved Automatic Hartford shock absorber which the Hartford Suspension Company, 170 Morgan street, Jersey City, N. J., is manufacturing.

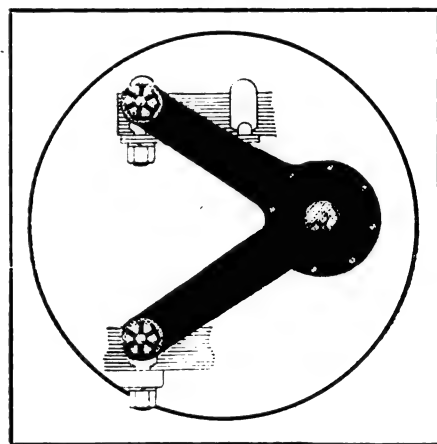
The distinguishing feature of the new product is the development of frictional resistance to uneven surfaces. The principle of operation is somewhat like that of the multiple disc clutch. The frictional element is composed of five steel discs, interposed between six brass discs, the whole being held under spring compression in a housing, which also retains the two arms connected to spring bodies.

When the wheels pass over an uneven surface, the two arms will come closer together, but the upthrow of the body is retarded by the friction action, and it gradually moves to its normal position. The six brass discs are provided with eight lugs on their periphery and are drilled to receive eight bolts, which connect them to one arm of the absorber. The interposing steel discs have internal lugs, which engage corresponding flutes on the body of the hub, rigidly attached to the other arm.

The mechanical action of the springs causes the brass discs to move in one direction and the steel discs to move in the reverse direction around their axes. Provision is made for regulation of the frictional resistance to different road and weight conditions, the adjustment being effected by applying a small wrench to the indicator at the side and moving it to the desired position.

Hardened steel bushings are used throughout and cotter pins lock the components of the unit so that it is impossible for them to become loosened or lost. Hartford shock absorbers are adaptable to any car and any type of spring assembly, the necessary special fittings being supplied without extra charge. Each set is accompanied by full directions and drawings for installation.

The large size absorber is designed for cars weighing over 3000 pounds and retails at \$60 per set of four; No. 2, or medium size, is for cars weighing between 2000 and 3000 pounds, and sells at \$40 a set, and No. 3, or junior size, is adapted to cars under 2000 pounds and retails at \$25 a set. A special set for Ford cars is also made and sells at \$16. The Hartford company announces an iron-clad guarantee, that, if any product made by them should prove unsatisfactory after 30 days' trial from date of purchase, it may be returned and the full purchase price will be refunded.



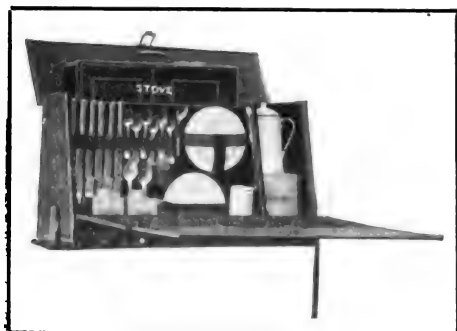
Improved Hartford Shock Absorber.

CAR ACCESSORIES AND EQUIPMENT.

PRENTISS-WABERS COMMISSARY OUTFITS.

Complete Auto Kitchenette Which Can Be Conveniently Carried on the Running Board.

The Prentiss-Wabers Manufacturing Company, 28 Island avenue, Grand Rapids, Wis., is producing complete commissary outfits for motorists which contain some novel and practical ideas. The outfits include all the utensils necessary in preparing and serving a meal, from a stove to the dishes and silver ware. They are comparatively light in weight and can be carried conveniently on the running board of the car. A very hot flame can be secured from the gasoline stove, which is wind proof and free from explosion dangers.



Auto Kitchenette.

The largest size outfit is that designed for parties consisting of six persons. This is provided with a No. 1 Moat folding gasoline stove, which is fitted with two regulation gas stove burners and an oven 10 by 13½ inches by eight inches, also included are two stew and two frying pans, one bake dish, one 12-inch platter, six dinner plates, cups, knives, forks, teaspoons, two table spoons, a butcher and a kitchen knife, a two-quart coffee pot, one flour or bread box, coffee and sugar canisters and salt and pepper shakers.

The case in which the utensils are carried measures 17½ by 28 by 12 inches, and the weight is 75 pounds. The complete outfit retails at \$37.50. Another outfit, similarly complete, but designed for four persons, and the stove having no oven, sells at \$26, while the deluxe equipment, composed of aluminum, 12 cwt. silver plate, and white enamel, retails for \$50. A two-party outfit is also made. The company will send further information of its products to inquirers who mention this magazine when writing.

UNIVERSAL TEST CLIP.

Time Saving Clips for Restoring Storage Batteries Which Are Sold at Exceedingly Low Price.

The new No. 13-A clip for charging storage batteries, which the R. S. Mueller & Co., 431 High street, Cleveland, O., manufactures, provides instant attachment and is usable over and over again. It is made of copper and lead, plated for protection against acid fumes, and is practically indestructible; it will carry 20 amperes without heating, and has wide jaws, provided with sharp teeth that bite through any corrosion on the binding post.



Universal Test Clip.

land, O., manufactures, provides instant attachment and is usable over and over again. It is made of copper and lead, plated for protection against acid fumes, and is practically indestructible; it will carry 20 amperes without heating, and has wide jaws, provided with sharp teeth that bite through any corrosion on the binding post.

out heating, and has wide jaws, provided with sharp teeth that bite through any corrosion on the binding post.

An advantage in the use of the Universal clip is that a series of batteries can be easily charged, by attaching a clip to each of several lengths of lamp cord and snapping the clips over the lugs.

The price of each clip graduates according to the quantity purchased. Singly they cost 15 cents each; in lots of 10 at the rate of 12½ cents each, and in lots of 100, 10 cents each. Further information can be obtained from the company by those who mention this magazine when writing.

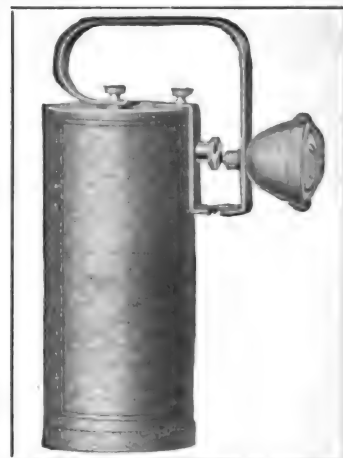
C. B. "MIDGET" ELECTRIC HAND LAMP.

A Light That Can Be Attached to an Ordinary Dry Cell and Can Be Utilized at Any Time.

The William J. Bailey Company, 401-7 Mulberry street, Newark, N. J., well known as the producer of high-grade automobile specialties, is manufacturing the C. B. "Midget" electric hand lamp for use on the road or in the garage.

It has a small frame that can be fitted to the terminals of an ordinary dry cell, which carries a socket connection for a small electric lamp and a reflector. The frame serves as a handle by which the combination can be carried.

It can be attached almost instantly, and can be carried in the tool box or like convenient place. There is no danger in the use of the lamp in gasoline fumes. It is not dependent upon connections or wiring for circuits, and is not affected by temperature or climatic conditions. The lamp will burn constantly for 60 hours on one dry cell and produces a strong illumination. It is finished in polished nickel and is sold without the cell for \$1.



C. B. "Midget" Electric Hand Lamp.

A VALUABLE GARAGE MANUAL.

Manufacturer of New Departure Ball Bearings Has Published a Very Valuable Garage Manual.

Few companies, or persons, in this country today are in better position to undertake an authoritative publication of facts relating to ball bearings and their treatment in garages, etc., than is the New Departure Manufacturing Company, Bristol, Conn. The company's engineers are all accomplished scientists in their different fields and their researches have been exceedingly exhaustive.

The new garage manual, which also incorporates a complete list of the company's distributors, published by the New Departure Company, is therefore a valuable adjunct to any public or private garage. It is advisable that interested persons correspond immediately with the company before the edition is exhausted. Mention of this publication when writing will insure considerable attention.

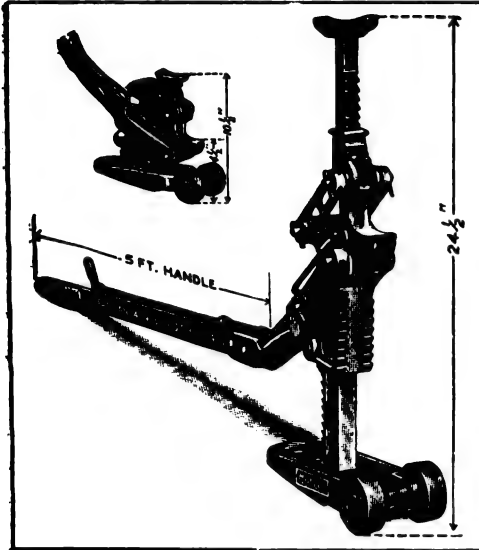
Among the several other New Departure Company publications is a profusely illustrated booklet, which describes interestingly and thoroughly the processes of manufacture through which New Departure bearings pass. The booklet is educational in its nature.

TOOLS AND EQUIPMENT FOR THE GARAGE.

MOSCO EXCEL GARAGE JACK.

A Powerful Type of Jack Which Easily and Quickly Raises a Light or Heavy Automobile.

The Motor Specialties Company, Waltham, Mass., manufacturer of the well known line of Mosco products, manufactures the Excel garage jack, shown in the accompanying illustration.



The Excel Jack Sold by the Motor Specialties Company.

It is a sturdy and powerful tool, and can be utilized on light cars, as well as those of the heavy type. The jack is specially designed to meet the requirements of repair shops, service stations, garages or any other place where a jack can be used to advantage. A powerful leverage is obtained with but little effort, by means of the five-foot handle. One full stroke of this handle will raise a car $4\frac{1}{2}$ inches. The range of lift is from five to 26 inches from the floor. The weight of the jack is 50 pounds, but it is made portable by means of a pair of rolls being fitted at one end of the base.

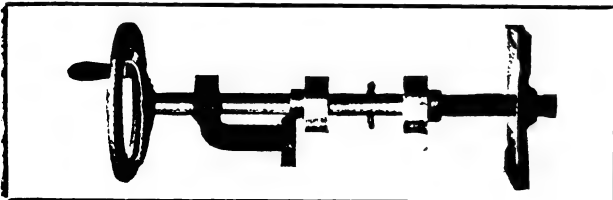
The manufacturer offers a liberal discount to garage men and dealers, to whom the 1915 Mosco catalogue will be sent upon request by mentioning the Automobile Journal.

HEISER CYLINDER BORE.

Efficient Hand Operated Tool for Boring Cylinders of Ford Cars with Ease and Speed.

The reboring of cylinders has been until recently a task for long experienced experts, because of the great amount of truing, levelling and general accuracy demanded. In the majority of cases it had to be done upon a lathe, but there is now being manufactured a manually operated tool with which it is unnecessary to rotate the cylinders, as of old.

It is the product of the Heiser Tool Company, Kingston, Mo., and is designed especially for Ford car cylinders. As the front and back walls of the cylinder are not subject to great wear, they serve as guides for align-



Heiser Reboring Tool for Ford Cylinders.

ing the cutter carrying the shaft in a perpendicular position in the cylinder. Tapered centering blocks are provided with the tool. These blocks are placed at opposite ends of the cylinder bore and always bear against the unworn portion, keeping the tool in a central position until the permanent bearings can be securely fastened to the opposite sides of the engine.

The permanent bearings fasten to the top of the motor, using the same bolt holes employed for the cylinder head. The feed plate is made with a threaded split boss through which the shaft is fed to the cylinder bore. The cutting tool is adjustable and centrally located on the shaft. The retail price is \$70. In addition to this tool, the company also makes oversize pistons, complete with wristpins, bushings and rings, for \$1.50 each.

The permanent bearings fasten to the top of the motor, using the same bolt holes employed for the cylinder head. The feed plate is made with a threaded split boss through which the shaft is fed to the cylinder bore. The cutting tool is adjustable and centrally located on the shaft. The retail price is \$70. In addition to this tool, the company also makes oversize pistons, complete with wristpins, bushings and rings, for \$1.50 each.

NEVER-RIP WORK COAT.

A Serviceable and Conveniently Constructed Mechanic's Work Coat Which Involves New Pocket Ideas.

One of the distinctive features of the work coat made by the Beaver Dam Overall Manufacturing Company,



Never-Rip Work Coat.

Beaver Dam, Wis., is that there is a series of pockets arranged to fit completely around the waist of the wearer. In these pockets can be carried a large number of tools while working around the car or garage.

The coat affords complete protection to the clothing, as shown in the illustration. It is designed for the mechanic in the garage and for the car owner as well, and is made of enduring materials, either in water finished blue denim or olive color khaki. Either short or long sleeves are furnished, as specified. The retail price of each is \$1.25.

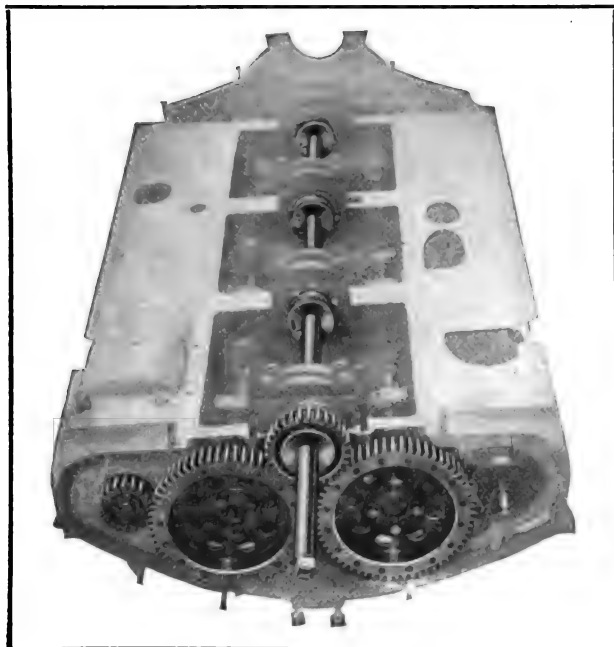
PROFIT MAKING EQUIPMENT.

A Dependable Aligning Reamer Which Not Only Bore Main Crankshaft Bearings, but Burnishes Them.

One of the best and most practical tools which can form part of the equipment of any garage, repair shop or

TOOLS AND EQUIPMENT FOR THE GARAGE.

service station, is an efficient aligning reamer for scraping in main crankshaft bearings, as made by the Harding Manufacturing Company and sold by the Harding Dis-



Martell Aligning Reamer.

tributing Company, 40 Court street (Scollay building), Boston, Mass. The old method of doing this work by hand is very lengthy and uncertain, on account of the necessity of taking many impressions of the heavy crankshaft.

The Martell aligning reamer, manufactured by this company, is guaranteed to accurately bore the bearings to size and also burnish the surface, in less than one-fourth the time that would be taken by hand work. It will be seen that the user of a device of this type should greatly increase his profits by being able to produce a greater amount of satisfactory work, which will always result in increased patronage.

The shaft on which the reamer operates is first lined up in the bearings to be reamed, by means of the adjustment of the aligning shaft by the double eccentric bushings. The two eccentrics, one within the other, are each separately adjusted by means of a vernier reading graduated scale; when the correct adjustment has been reached it is locked in place. The outer surface of the bushing is tapered and finely threaded, so that it may be screwed firmly into the bearings. The correct mesh of gears is easily obtained by means of these eccentric bushings.

Equipment No. 1 is to cover all sizes of crankshaft bearings from 1½ inches to 2¼ inches, and equipment No. 2 for smaller bearing work covering sizes from 1¼ inches to approximately 1½ inches. A great number of these reamers are now in use in the leading garages and service stations in the country, and full information will be promptly furnished to those who mention this publication when writing.

NEW LINE OF GOGGLES.

Chicago Manufacturer of Goggles and Eye Glasses for Motorists Announces New Line.

The New Era Optical Company, 123 West Madison street, Chicago, Ill., manufacturer of a full line of goggles for automobilists, has issued a new catalogue,

which fully describes and gives the prices of the widely known New Era Toric Goggles. These prices are remarkably low in consideration of the value the company gives the purchaser. The goggles are excellently made and are equipped with the best of lenses. A specialty of the product is the wide variety of scientifically colored lenses designed to minimize the sun's rays and to eliminate the glare from sandy roads. When writing to the company ask for the latest catalogue and mention the Automobile Journal.

NEW GREENERD ARBOR PRESS.

Bartlett Company Produces a Powerful Arbor Press That is a Positive Necessity in Repair Work.

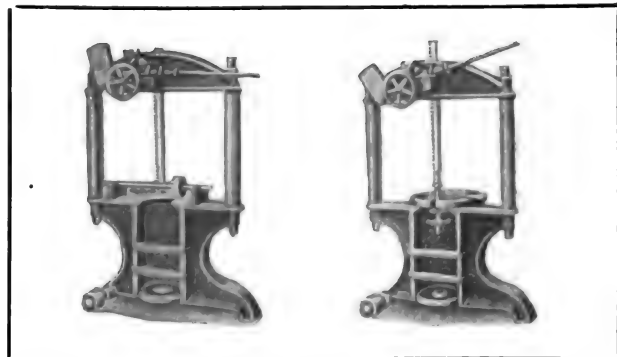
A good arbor press ranks next to the bench and vise in any modern garage or repair shop. For such work as forcing off transmission gears, flywheels, drive shaft gears, straightening of axles, shafts, frames and other jobs that require high and steady pressure, the arbor press is immensely advantageous over the old-time method of using a sledge hammer, both because of the ease with which the work can be done and because it will result in a satisfied customer.

The Edwin E. Bartlett Company, 322 A street, Boston, Mass., is the manufacturer of several types of arbor presses, of which there are 17 sizes. One of the company's latest products is the No. 15 special Greenerd arbor press, of which there are more than 200 now in actual service. While of high quality material and workmanship, it is priced at a very low selling cost for quality equipment, and while it is not too large for the small shop, neither is it small for the large establishment.

As can be seen in the accompanying illustration, there is a big clearance space between the two uprights, which permits of work being done on large wheels, pulleys and other components. This feature in itself should prove to be a big profit maker, as the motoring public will naturally patronize the shop where it is positively certain that the press is capable of doing repair work without the necessity of resorting to the sledge hammer or other unworkmanlike methods.

The company lays emphasis on the fact that one man can develop a 10-ton pressure, and two men can produce the equivalent of 16 tons. The largest of automobile work can be easily taken care of. The press is very powerfully constructed and will stand practically any amount of abuse. It occupies but small space and may be easily moved to any part of the working floor upon the two wheels fitted at the rear.

The large variety of Bartlett presses ranges from the smallest practicable size to one having a pressure ca-



No. 15 Greenerd Arbor Press, Showing Large Working Surface and the Gears Being Pressed Off a Transmission Countershaft.

capacity of 40 tons. Details concerning the No. 15 Greenerd press and the others mentioned can be obtained from the manufacturer by mentioning this magazine.

TO THE PACIFIC IN A PACKARD.

WHEN the experimental trucks of the new Packard series were nearing completion a three-ton model was selected for a typical Packard testing trip over the mountains and deserts from Detroit to San Francisco, along the route of the Lincoln highway.

Months of work on the new worm drive types had brought them to a state of perfection, where they answered every demand put upon them by testing trips near the factory. But those tests, severe as they were, left some doubt as to what the truck might do after laboring steadily for a month through the sand and over the hills with a capacity load.

The new truck left the Packard plant in Detroit with three tons of freight on board, and a

cooking utensils and all the equipment for camping. They shunned hotels practically all the way across the continent. They slept under the stars and slept soundly.

The first leg of the trip was from Detroit to Elkhart, Ind., where Michigan tourists, westward bound, strike the Lincoln highway. Four days out, without encountering particular difficulty, except that of getting out of mud holes, the truck crossed the Mississippi near Clinton, Ia., and from there on the great weight of the outfit frequently

proved to be too much for old and weak wooden bridges. It broke through often, but the crew adhered strictly to its orders to rebuild the bridge after each cave in and most of the bridges were left in better condition than they had been when the truck went through.



Bridge Troubles Encountered by the Packard Transcontinental Testing Crew and Truck, and the Methods Employed to Recover the Machine from Disaster and to Reconstruct the Bridge.

crew of three men. The outfit weighed seven tons. A prairie schooner top had been fitted to the standard chassis to protect its crew from the desert sun and from the bad weather that might be encountered along the way. On this top was painted in big letters the legend, "Detroit to San Francisco."

There had been some rain before the start was made and after rain the mud on Michigan roads often blocks even a passenger car. It made things very interesting for the truck and its crew, who were busy frequently with planks, stone and other material for supplying traction to the wheels in all but bottomless spots on the road.

In the truck body the party carried tents,

The gumbo soil in Iowa, through Clinton, Cedar Rapids and Marshalltown, was wet. It clung to the wheels in hundred pound chunks, oozed under the brake linings, and at times completely buried the wide dual wheels on the rear of the truck. But the mechanism proved its soundness and strength by never faltering in the onward progress.

There is much sand in Nebraska. It holds up under the 3000 or 4000 pound weights of large touring cars, but the seven tons of truck often sank to the hub caps. That kept the motor buzzing away on low gear for hours at a time, but it never interrupted the steady and sure progress of the great machine.

In Wyoming, with the high, cool peaks of the

Rocky mountains on every side, the crew worked frantically for 12 hours laying planks on which the truck ran, and carrying them up again from the rear as soon as the machine had passed. It was a very hot day, and the three men carried planks for 12 hours. At the end of that time the odometer indicated a progress for the day of seven miles.

Out of Reno, the Lincoln highway runs for 14 miles along a stretch of abandoned railroad bed. It is steeply banked and was built for just one railroad track of standard gauge. When a tourist on this stretch meets another car it is ordinarily necessary that one should back up for miles until the end of the embankment is reached. Each side of the fill is banked to a full 60 degrees.

It was when about half way over this stretch

pull against the truck raised itself out of the hole onto the crown of the road again.

The California line was crossed and San Francisco reached 35 days after the start had been made from Detroit. That included two days rest at Salt Lake City, which the tired crew found necessary.

The truck arrived at its destination in perfect mechanical condition and ready to start on the return trip if the Packard officers chose.

Under the road conditions which had prevailed along the route, the test was probably the most severe that had ever been given a truck by an American maker. It was fully equal in severity to the work that trucks have been doing in the transport service of the great European armies.



Scenes Along the Desert Route and a Sample of Iowa Gumbo Soil—In the View at Top Left, Consulting Engineer Russell Huff Is Preparing a Meal on the Laramie Plains of Wyoming. Bottom Right Shows the Famous Borax Team in Death Valley.

that the truck met a touring car. The truck crew measured the road and decided that the two could pass. So the truck was very carefully edged along to the extreme limit of the fill on one side, inch by inch on low gear, until the car and the truck rolled past each other with scarcely half an inch between their hub caps.

But, as the truck put on power to get back into the centre of the road the embankment gave way and it sank into the earth with wheels on each side of the crown of the road.

Ropes and cables were made fast to five telegraph poles ahead and around a rear hub. The poles gave signs of falling under the strain, so a heavy piece of timber was buried deeply in the ground and the cable attached to it. With this to

Before it began the transcontinental trip the truck had worked over 14,000 miles of Michigan roads with an overload and two shifts of drivers keeping it going. The San Francisco trip was intended merely to finish off the testing.

After covering 17,000 miles the only replacements necessary are said to have been a new muffler shell, a new dash and the relining of a service brake. No repairs of any nature were made on the motor.

There are seven new models in the Packard line, of which the truck driven to San Francisco is one. They are of one, 1½, two, three, four, five and six-ton capacities.

Among their features is the centralized control board, which places the means of controlling

every part of the truck at the driver's fingers; electric starting and lighting; left drive for greater safety in crowded traffic and to permit the driver to alight at the curb. All moving parts are enclosed against sand, dust and water, assuring a longer life and more reliable service. The new trucks are very silent in operation.

This Packard truck was the third to travel across the continent. A Saurer went from Denver to San Francisco and from Pueblo to New York in 1911. An Alco went from Philadelphia to Los Angeles in 1913, but followed the southern route along the Texas border, which is generally agreed to be an easier route than that of the Lincoln highway.

Such are the rigorous tests which the

beginning of an effort to introduce the electrics into that country in large numbers.

There are many electric plants in Norway owned by influential persons who see in the electric car an opportunity to increase their current sales. Electricity is cheaper there than gasoline. There are many hills in the country, but with the best American batteries a car is able to make 100 miles and charging stations are so numerous that it is possible to travel all over the country in electrically propelled machines.

Automobiles of every type are used in Norway only in the summer when, owing to the long days, the electrical generating plants are operated far be-



Road on Desert Between Austin and Fallon, Nev.—Top, Centre Views Show Laborious Work That Was a Constant Feature of the Trip. Two Wyoming Views Showing the Packard Truck Negotiating Sandy Grades.

Packard company compels all its new models to undergo, and successfully withstand, before commercial production is begun.

ELECTRICS IN NORWAY.

Arthur Bjerke, an electrical engineer of Christiania, Norway, recently delivered an address in that city in which he strongly urged the suitability of the electric automobile for use in Norway, and as his talk was given great prominence by all Norwegian newspapers, it may be regarded as the

low capacity, so that an attractive rate can be made on current. The load on these plants is very light in the middle of the day and charging done at that time can be done cheaply.

The campaign is likely to open the way for the sale of American electric cars and American electric batteries.

More than 150 Studebaker owners living in Arizona have announced that they will join the motor caravan going to the Pacific coast exhibitions.

AN AMPHIBIOUS MARMON "41."

Dr. F. N. Rogers of Manchester, N. H., recently made a trip over the Apache trail between Globe and Phoenix, Ariz., and in crossing Gila creek in the Salt river valley, the car went through water that came about three inches above the floor boards.

The Apache trail is one of the most interesting stretches of road in the country, and it supplies a marvelous 120-mile drive between the two Arizona towns. It passes the Roosevelt dam, an irrigation project that is one of the engineering wonders of America.

The trail was once known to the Indians only. It was discovered to white men by Conquistadora Coronado, and is now a government highway. There are four swift running rivers that must be

good speed for the track. Numerous well known coast drivers, some of them using special racing cars, were entered in the events.

ADVERTISE CLUB TEST RESULTS.

Vacuum Cup tires were submitted for mileage tests to the engineers of the Automobile Club of America and in order to base advertising on definite facts these tests are being used as the basis of the maker's current campaign.

The Pennsylvania Rubber Company was the first to submit its tires to the club in order to obtain a basis on which the tire buyer, confused by conflicting claims of the superiority for various tires, might make an intelligent choice.

The result of the test was gratifying to President H. W. DuPuy of the company and the Automobile Club of America. Records for individual tires of 10,164, 9220, 8940 and 7500 miles were run up, while one casing, owing to special conditions, accounted for in the club's report, lasted only 2660 miles. During the test of 144 days no evidences of defective material or workmanship were discovered.

An addition to the Pennsylvania Rubber company's factory, erected at a cost of three-quarters of a million dollars, has recently been put in operation, permitting an increased production, which has brought down the price of the tires, and a new toughening

process is claimed to have increased mileages by about 50 per cent.



Waterproof Electric System of Marmon "41" Undergoing Severe Test on the Apache Trail.

forded. At these fords the government keeps horses and men ready to help travellers through.

The Marmon's water proof electric system, which prevents short circuits in such instances, proved of great value on the trip. Dr. Rogers wrote enthusiastically to the New England distributor concerning the performance of the car.

PAIGE WINS IN FIVE-MILE RACE.

In the first automobile race meeting held in Spokane, Wash., and run on a half-mile dirt track, a Paige car entered by the Western Motors Company. Paige distributors, covered the track in 38 seconds and won a five-mile race in the semi-professional class, in 6:29½, which is

NEW QUARTERS FOR THE S. A. E.

The Society of Automobile Engineers has moved to well lighted and comfortable new quarters in the Engineering Societies' building, 29 West 39th street, New York City.

The new council room is separated from the members' room by a folding partition, which can be folded up when a larger hall is needed for meetings of the standards or any of the large committees. The general office is spacious and light and all the desks and filing cabinets have been arranged with efficiency in view. The conference room is also used for editorial work.

MONARCH EIGHT PRODUCTION BEGUN.

MARKETING the Monarch Eight was begun with the shipment from the Detroit factory of 125 cars in June. Strong eastern financial backing has been secured for the reorganized company, of which R. C. Hupp is president, and several men identified with New York banking circles are active in directing the company's affairs.

Arthur Frost Spaulding, of Spaulding, McClellan & Co., of New York City, is vice president, and George B. Turner, formerly of the Banker's Trust Company of New York City, is secretary and treasurer. An executive committee consisting of Messrs. Hupp, Spaulding and

on three points from the main frame. The motor is a Herschell-Spillman, eight-cylinder, V type. The cylinders have three-inch bore and five-inch stroke. The motor is designed for high speed operation and will develop 74 horsepower at 2400 revolutions per minute. The cylinder blocks are set at an angle of 90 degrees to each other and the cylinders are L head type. The cylinders are slightly staggered. This does away with forked connecting rod ends and double concentric crank pin arrangement. The connecting rods are side by side on the crank pins and are interchangeable. They are I beam forgings of the two-bolt cap construction.



Monarch Eight-Cylinder Model for 1916, with Seating Capacity for Seven Passengers and Selling for \$1500.

Turner has charge of the company's finances and manufacturing.

The production and marketing organization is composed of veterans in the automobile industry. T. P. C. Forbes is director of sales and vice president, A. A. Lehr is director of engineering and purchases, J. L. Bell is production manager and M. L. Shanks is assistant secretary and treasurer.

Mr. Lehr began in 1901 with the Pope-Toledo Company, went with the De Luxe organization in Detroit and was with E-M-F, Studebaker and General Motors companies in the purchasing departments.

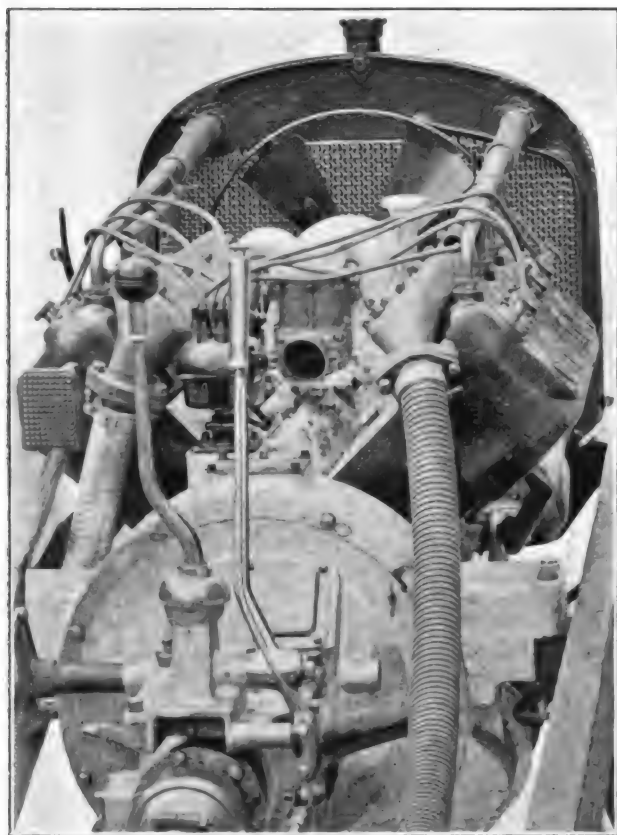
The new car is a 125-inch wheelbase seven-passenger type and it is sold for \$1500.

The power plant is a unit construction, combining motor, clutch and transmission suspended

The three-bearing crankshaft is carried on bearings two inches diameter. The front and centre bearings are three inches and the rear $3\frac{3}{4}$ inches length. The camshaft has 16 integral cams, one for each valve. The oiling system includes a gear pump, located in the rear end of the oil pan, that is driven by a vertical shaft. The pump will supply the oil at a pressure of 40 pounds and by convenient adjustments the pressure may be regulated as desired. The crankshaft and camshaft are drilled, the former from the main bearings to the crank pins, and the latter from end to end. All these channels have outlets at the bearings. The oil is forced through tube to the main and camshaft bearings and to the timing gears. Tube leads from the connecting rod bearings carry lubricant to the wrist pins. The tappets, cams, cylinders and pistons are lubri-

cated efficiently by the splash system.

Water circulation is actuated by a duplex centrifugal pump. The system is designed to



Unit Power Plant of Monarch Eight-Cylinder Model.

automatically maintain a uniform temperature in all cylinders. A cellular type, round edge radiator is used, and an 18-inch fan mounted on ball bearings promotes radiation.

The dry plate multiple disc clutch is composed of steel discs faced with asbestos. The transmission gearset is a three-speed sliding gear type. All gears and shafts are of $3\frac{1}{2}$ per cent. nickel steel. The carburetor is the latest type of Zenith, designed for eight-cylinder motors. Ignition is from an At-water-Kent system, with automatic spark control and a large storage battery.

The lighting and starting equipment is the Ward Leonard two-unit type. The generator is located at the left side of the motor and is driven by worm gears direct from the

front timing gears. The starter is at the right side, operating on the flywheel with Bendix drive.

The Yuster rear axle is a full floating type, with one piece pressed steel housing. All differential gears are carried on Hess-Bright ball bearings. The large removable rear cap of the housing permits convenient inspection and adjustment. The bevel gears are helical cut. Axle shafts are heat treated chrome nickel steel.

The front axle is a drop forged I beam. Steering knuckles and spindles are chrome nickel steel, forged from a single piece. Special hardened and ground pins turn in hardened and ground bushings, minimizing wear and permitting easy replacement. The front wheels run on tapered roller bearings of Bock type and are easily adjustable.

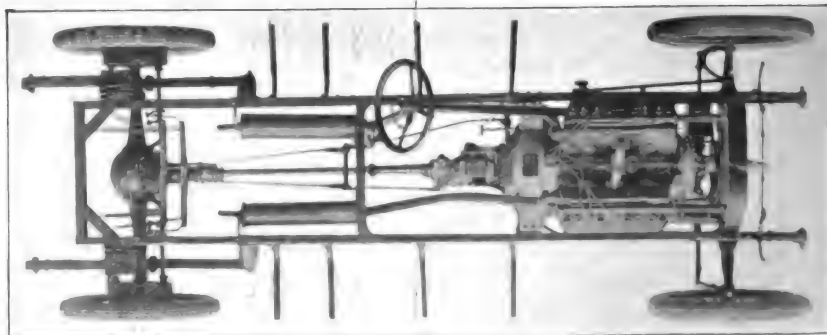
There are two large internal brakes on each rear wheel, with shoes $1\frac{3}{4}$ inches wide that are lined with multibestos and operated by cams. The brake drums are 14 inches in diameter and are protected by close fitting dust shields.

The wheels are equipped with Funk 34 by four-inch demountable rims and Goodrich 34 by four tires, non-skid at rear and plain tread at front.

The throttle and carburetor control levers are mounted on the steering column, which is at the left side. The control levers are in the centre. The gasoline is supplied from 15-gallon tanks at the rear of the cars by vacuum feed systems.

The body is an advanced streamline type, with very graceful cowl and a low and rakish general effect. The doors are unusually wide. The body interior is very roomy and is upholstered with high-grade automobile trimming leather. The cushions and backs are upholstered Turkish type.

The space between the divided front seat affords passage from the front to the rear compartments. The rear seat is 52 inches wide, with ample room to seat three people in comfort. The



Constructional Details of Chassis of Monarch Eight.

extra seats fold into recesses in the floor.

The equipment includes a one-man silk mohair top, with quick attachable curtains and hood and Gilliam patent top supports; special two-bulb headlights, electric tail lamp, electric motor horn, portable dash and trouble lamp, ammeter, extra rim, rear tire carrier, clear vision windshield, Stewart speedometer driven from the propeller shaft, storage battery, Ward Leonard electric system, repair tools, motor driven tire pump and gasoline gauge are other items in the entirely complete equipment.

PENNSYLVANIA MAKES BIG AVERAGES.

Big mileage averages continue to be recorded by the Pennsylvania oil proof vacuum cup tires, the latest noteworthy performance being announced by Schnuit Brothers, Baltimore dealers of the Pennsylvania Rubber Company.

Nine tires have scored a total run of 99,199 miles, or an average of 11,022 miles. The highest mileage by an individual casing was 14,025; the second, 11,685, and the lowest, 7236 miles. A Ford size casing covered a distance greater than some of the larger sized tires. A V. C. motorcycle tire, in the service of the Baltimore police department, ran a total distance of 18,037 miles.

The significance of these figures is that the average, considered after deducting the heavy mileage scored by the motorcycle tire, shows 3386 miles above the certified average scored last year in the official test of stock vacuum cup tires by the Automobile Club of America.

The final results of the A. C. A. test, coupled with the added endurance effected by the process of toughening, have led the Pennsylvania company to announce an increase in guaranteed mileage service to 6000 miles. This guarantee embraces tires bought subsequent to the notice and also those bought before and still in use.

AMERICAN TRUCKS—LONDON 'BUSSES.

What would have seemed an impossibility a year ago has come to pass in the purchase by the Great Western railroad of England of 30 American motor trucks to be used in motor 'bus work

in London. These American trucks are of the internal gear drive type and have passed successfully the rigid tests for quiet operation that are imposed in the English metropolis.

This transaction is, of course, an outcome of the war. All English manufacturers are so busy building trucks for army transport that the railroad found it impossible to replace the cars commandeered at the beginning of the war with others of English make.

The strict regulations regarding the trucks used for 'bus work in London, particularly regarding noise, have not been relaxed, and the fact that the internal gear drive American product has been accepted is a compliment for that type of truck.

Because of noise, the chain drive type of 'busses has been banished from the streets of



Goodyear's Latest Pneumatic Truck Tire, Size 48x12, Mounted in a Roadster to Show Comparative Size.

London. English makers developed in its place a special type of shaft drive. Continental designers preferred the internal gear type and now that these have been introduced into England a change in the conventional English design is likely to be brought about.

Arrangements have been made by the New England Casualty Company of Boston and the Insurance Company of the State of Pennsylvania, of Philadelphia, whereby a single policy will be issued to auto owners covering all losses that may occur to an automobile.

The policy will cover fire, theft, liability, property damage and collisions. All adjustments with the owner will be made by one agent, who will report separately to the two companies. The new plan went into effect June 1.

INVESTIGATE PRICE MAINTENANCE.

A very thorough investigation of the effects of maintenance of resale prices, or price cutting on the sale of all merchandise, from the consumer's point of view, has been undertaken by a special committee of the Chamber of Commerce of the United States.

The committee is out after facts bearing on the matter and it asks any one who has definite facts to give to forward them to Paul T. Cherington, Harvard university, Cambridge, Mass., who is chairman of the committee.

Evidence is desired as to whether or not identified or unidentified goods are superior from the consumers' point of view; whether advertised or unadvertised goods are more advantageous for the consumer to purchase at the same price; whether legislation is desirable to require merchandise to be truthfully described in advertising; whether or not such legislation is necessary;

ers and owners, and the author is a recognized automobile engineering authority and an expert on the Ford car, who has driven and repaired those machines for a number of years. All parts of the Ford car are described and all repair processes are explained and fully illustrated.

The following brief resume of the special chapter titles will indicate its scope: The Ford car, its parts and their functions; the engine and auxiliary groups; details of chassis; how to drive and care of the Ford; overhauling and repairing mechanism.

The book is published by the Norman W. Henley Publishing Company, 132 Nassau street, New York City, and sells at \$1 the copy.

OVERLAND TRAIN LOAD FOR FLINT.

Seventeen car loads of the new 1916 model Overland were shipped recently from the Toledo factory to the dealer in Flint, Mich., in the heart



Drive-Away Day at the King Motor Car Company's Plant at Detroit, Mich.

whether or not competitive conditions prevent the making of exorbitant profits on unidentified merchandise; whether price cutting reduces value of, and hinders distribution of, advertised goods; whether price cutting hinders reduction of distributing costs; whether price cutting reduces quality standards of identified articles.

The inquiry is of great importance to manufacturers, retailers, and all who are interested in advertising.

"THE MODEL T FORD."

Victor W. Page, M. E., has written a 300-page book entitled, "The Model T Ford," which bears the stamp of authority and very comprehensively covers the subjects of construction, operation and repair. It is very well illustrated and there are more than 100 specially made engravings and two large folding plates.

The book is written specially for Ford driv-

ers of the Michigan automobile belt. This large distribution of Toledo cars there is especially gratifying to Overland officials.

The new model has proved to be very popular also in Detroit. The first three days that the new demonstrators were there, and before they had been announced in the newspaper, 23 cars were sold at retail.

These indications, along with the great rush of orders that has followed the announcement of the new cars, are taken as showing that the new model will be the fastest selling car the company has produced. President Willys predicts the greatest year in the history of the moderate priced car. Nine thousand men are working overtime in the Overland factories.

Indications now point to the collection of at least \$500,000 by the State of Connecticut for automobile licenses during the fiscal year ending Sept. 30. This is \$100,000 more than 1914.

INDUSTRIAL HAPPENINGS AND COMMENT.

The Studebaker Corporation branch of New York City having outgrown its quarters, it has been decided to erect a concrete, fireproof building in Long Island City, near the Sunnyside yards of the Pennsylvania railroad. This addition will be devoted solely to service and storage purposes, and will be four stories high and 160 by 80 feet. An exclusive railroad siding will extend the full length of the structure in the rear. The Broadway branch, New York City, will be arranged as soon as possible for purely retail purposes, the first floor being devoted to pleasure cars, the second to used cars, and the third to general offices. A complete assortment of parts and stock will be carried on the fourth floor, and the fifth will be a salesroom for light Studebaker trucks. The new building will be completed for occupancy by Nov. 1.

The Kellogg Manufacturing Company, Rochester, N. Y., has been compelled by the demand for its standard and special pumps from manufacturers, jobbers and the trade to increase its floor space by 15,000 square feet. The Kellogg company for about seven years has frequently been forced to increase its space and machinery equipment.

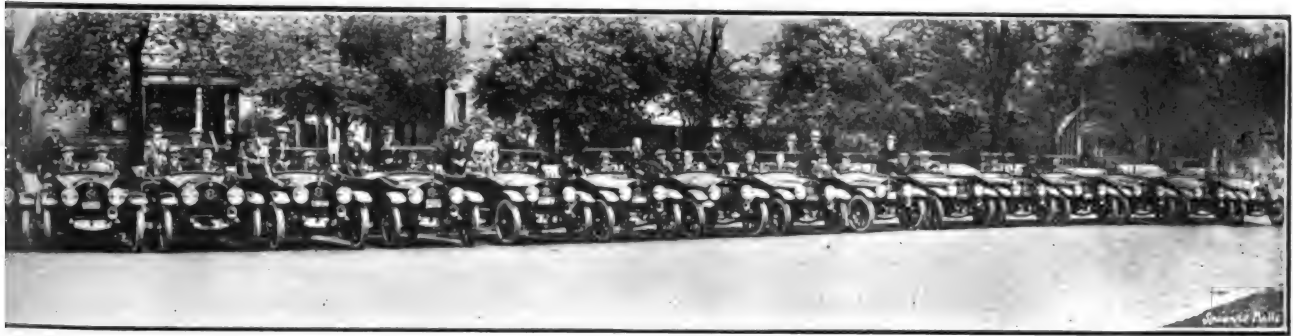
The Puritan Machine Company, Detroit, Mich., has adopted a unique system of advertising. President A. O. Dunk and several department heads and assistants recently covered prearranged routes through Michigan in automobiles and tacked up hundreds of metal signs bearing the Puritan name and trade mark, "All Parts for

Exposition to the Chalmers exhibit, which covers more than 1800 square feet. There are six cars on display, and the booth is surrounded by a nickel railing hung with double-faced velvet, maroon on the outside and blue within. Blue velvet carpet leads from the entrance of the booth to the centre, where a polished chassis of the Master Six is shown.

The Hoyt Electrical Instrument Works, Penacook, N. H., announces the appointment of Ernest M. Hobbs as district sales manager for the company, with headquarters at 967 Woodward avenue, Detroit.

Jacob Wiest of the J. Walter Thompson Company, advertising experts of Detroit, died recently at Saginaw, Mich., only a few hours after having sustained fatal injuries in an automobile accident. Before joining the Thompson company Mr. Wiest, after his graduation from the University of Michigan, was a member of the faculty of the Central high school, and later of a Polish seminary. Entering the newspaper profession, he became an editor of the Detroit Sunday News-Tribune and a well known writer. He is survived by a wife and a five-year-old son, Carl.

The King Motor Car Company, Detroit, Mich., recently held a mid west King dealers' drive-away day, after which dealers and owners drove away in 91 new King Eights. Prizes were awarded as follows: Seldner Merritt Company, Cleveland, won first prize among the distributors by driving away the largest number of cars, 28.



Dealers and New Owners Drove Away in 91 New King Eight-Cylinder Cars.

All Cars." Mr. Dunk is preparing another design which he states will soon be distributed throughout the United States and Canada, advertising Puritan products.

J. S. Hathaway, New England manager for the White company, located at Boston, won the White plaque, the trophy annually competed for by the company's 10 branches and awarded each spring to the branch which has shown the largest increase in volume of business during the year. The winning of the trophy by the New England office is regarded as further evidence of the steadily growing popularity of White cars and trucks in that section of the country. It is particularly gratifying to Mr. Hathaway because the plaque goes to Boston the first year after the erection of the company's new building in that city.

The Fafnir Bearing Company, New Britain, Conn., announces that its present selling arrangements with the Rhineland Machine Works Company, New York City, have been terminated, and that hereafter Fafnir ball bearings will be marketed direct from the factory at New Britain. D. D. Davis, formerly of the Rhineland company, will be in charge of the new sales organization. The proposed change does not effect the friendly relations of the two companies, it is announced. The New York office will continue as usual for the sale of Rhineland and R. B. F. bearings and inquiries regarding Fafnir bearings will be referred to New Britain as heretofore, but it is believed that the best interests of customers will be served by directing all correspondence relative to Fafnir bearings direct to the main office at New Britain.

The Chalmers Motor Company has laid comprehensive plans for the reception of visitors at the Panama-Pacific

Among the dealers, C. E. McWilliams, Newcastle, Penn., won second prize; and third went to E. J. Jones for being the private owner who had the longest drive back to his home. Among the events of the day were a four hours' instruction on the King Eight and addresses by Artemas Ward, senior, principal stockholder of the company, and his son, bearing the same name, who has been raised recently to the presidency.

The McManus Company, a nationally known advertising agency of Detroit, has changed its corporate title to the Power, Alexander & Jenkins Company, which is felt to be more representative of the personnel of the company than of old, the present officers, directors and stockholders having purchased the assets of the company more than three years ago. The officers of the company are: William S. Power, president; Kirk B. Alexander, vice president and general manager; W. Haddon Jenkins, Jr., secretary, and C. E. Will, treasurer. The directors are the officers and Louis Ling, Wetmore Hodges and G. P. Fletcher.

The Losler Motor Company has decided to open a retail sales department at the Detroit factory. In addition to a corps of salesmen there has been installed a force of skilled mechanics, which assures that customers will receive adequate attention.

The Briscoe Motor Company is reported as having purchased land in Jackson, Mich., on which will be erected a two-story structure, 250 by 300 feet, and in addition will be the construction of testing buildings, laboratories, office buildings and a half-mile testing track. It is also stated that Benjamin Briscoe, president of the company, is planning a trade school in Jackson, where young men will be taught the automobile building trade.

AUTO TRAIN AT EXPOSITION.

One of the best patronized features of the Panama-Pacific Exposition is the Fadgl auto train, which consists of a tractor equipped with a Ford motor and trailers, each of which will seat 20 passengers. Twenty trains are in operation, running on schedule between terminals at the Fillmore street entrance and the Massachusetts state building, the fare being 10 cents. The schedules and routes are so laid out, however, that a passenger may travel in the train completely around the grounds for a rate of approximately 50 cents an hour.

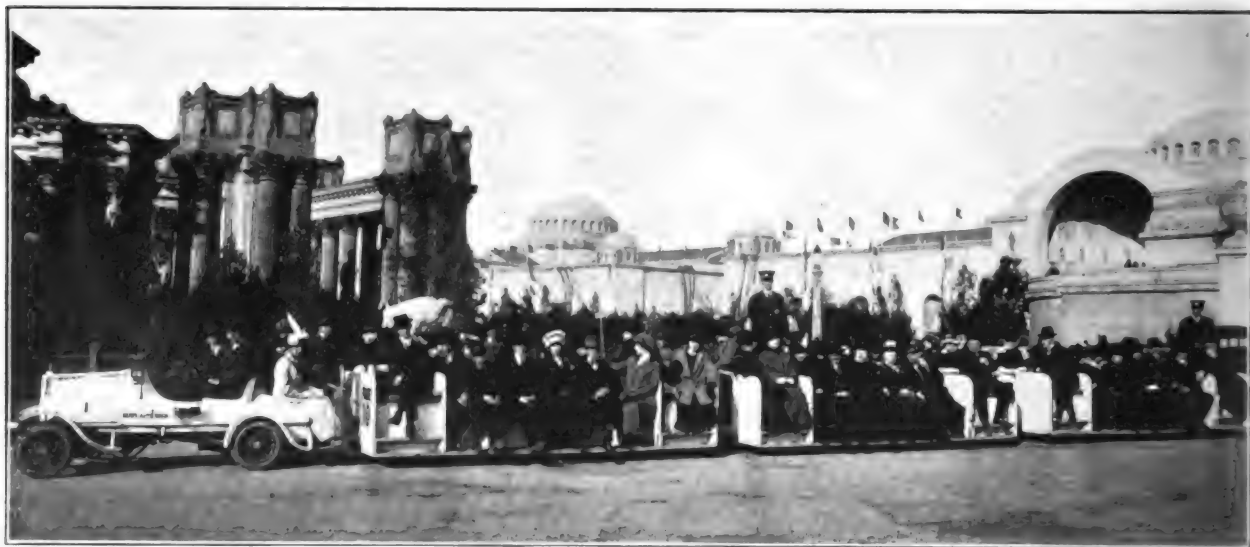
The illustration herewith shows a Fadgl train, and was loaned to the Automobile Journal for publication by the Danvers Auto Accessory Company, 18 Broadway, Pawtucket, R. I., whose

The system is simple and has proven extremely serviceable. The tractor is equipped with 21 by five-inch solid tires. Steering is accomplished through the draw bar by a diagonal rigging. Four wheels are used on each of the trailers.

GAS-TONIC NEW POWER FLUID.

A new fluid, which, when mixed with gasoline in small quantities, is claimed to increase the mileage by from 25 to 40 per cent., has been put upon the market by the White Manufacturing Company of Cincinnati. It is called Gas-Tonic.

B. W. Gaines, a physician who lives at 409 Broadway, Cincinnati, and who has used 50 gallons of gasoline treated by the mixture, declares that it brings about a great improvement in the operation of the engine. He declares that it does



Fadgl Auto Train in Operation at the Panama-Pacific Exposition.

automatic oiler is installed on the motor. This oiler efficiently and economically controls the oil supply of Ford motors by automatic action, so that there is always a constant level of oil, and it also provides a sight gauge by which to ascertain that there is neither an excess or undersupply of lubricant in the crankcase.

A feature of the train that appeals to timid passengers is that it is stepless, and all working parts are covered for the protection of patrons. One of the ingenious safeguards is the combined brake drag and draw bar arrangement. Each draw bar is jointed at the inner end and carries a weighted shoe, which is maintained above the ground under normal pull, but drops to check the momentum when the speed of the motor is reduced.

not heat the motor so quickly, knocks are overcome and power improved.

On the first 10 gallons he got 93 miles with his car; on the second 10 gallons, 108 miles; third 10 gallons, 118 miles; fourth 10 gallons, 130 miles; fifth 10 gallons, 148 miles.

The fluid is mixed in proportion of one ounce to five gallons of gasoline. It is claimed that no acids or other injurious substances are used in the fluid. Prominent Cincinnati motorists are interested in the venture.

Several of the companies which were expected to bid for 'bus franchises in New York City failed to enter their bids on the ground that the conditions under which the franchise was offered were too severe.

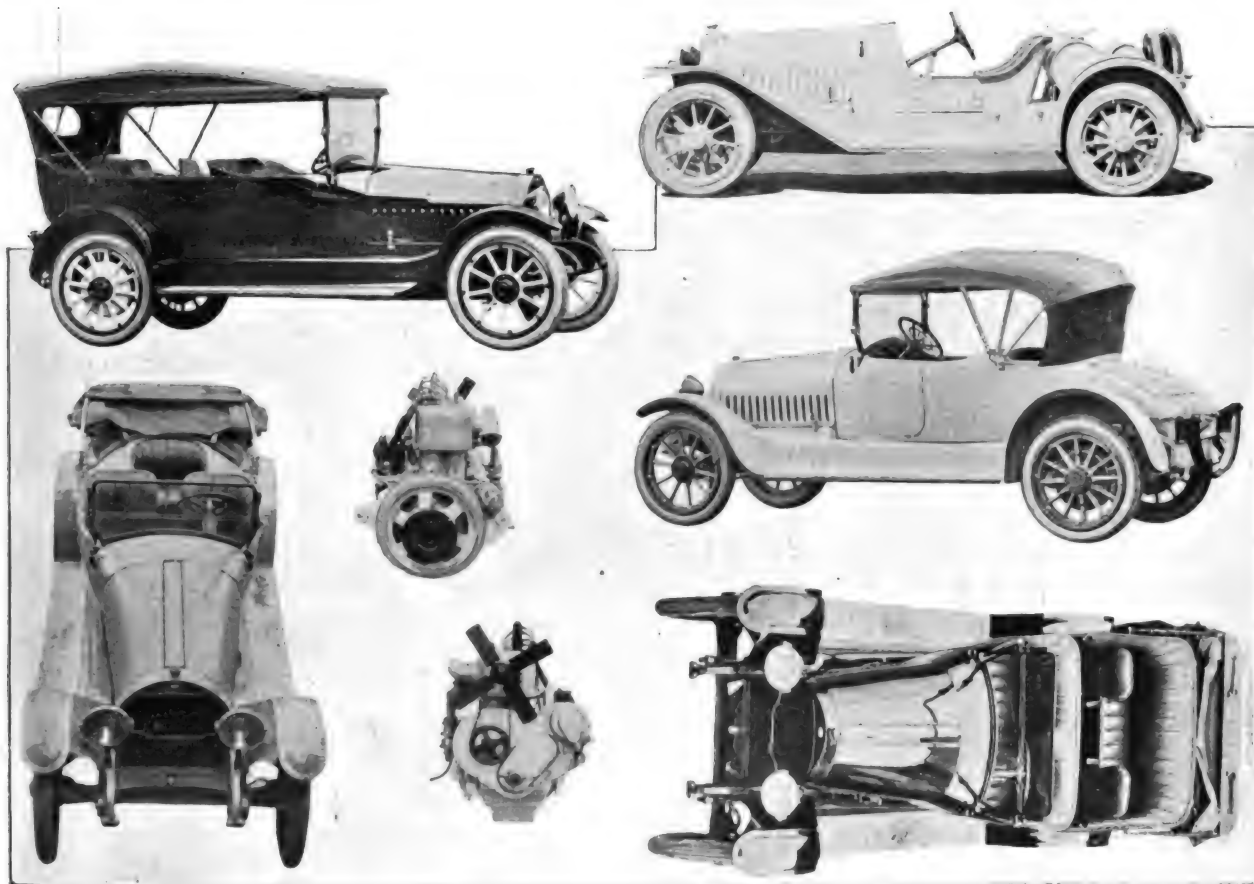
NEW MARMON SERIES ANNOUNCED.

SAVE for slight mechanical changes the new series of Marmon "41" cars for 1916, which has just been announced, differs from that of last year mainly in the bodies. These have been thoroughly redesigned and much improved.

Sheet aluminum has replaced sheet steel in all body work. The advantages claimed for this material are that it is lighter in weight, a deadener

front seat, so that a passenger may have easy passage to the third seat behind it. For this reason the only necessary entrance is through the front door.

At either side of the rear seat are compartments of generous size for carrying equipment, and under the rear deck is another large compartment. Tires are carried on specially designed



The Marmon Seven-Passenger Touring Car, Speedster and Roadster Which Comprise the New Series 41 for 1916, Together with Views Showing Interiors of All Cars but the Speedster, and Two Views of the Motor.

of sound, and has a better surface than sheet steel on which to apply the finish.

The new bodies are substantial in design and are carefully finished, all the work is done in the Marmon shops. A new type of car has been produced in the three-passenger roadster with a divided front seat.

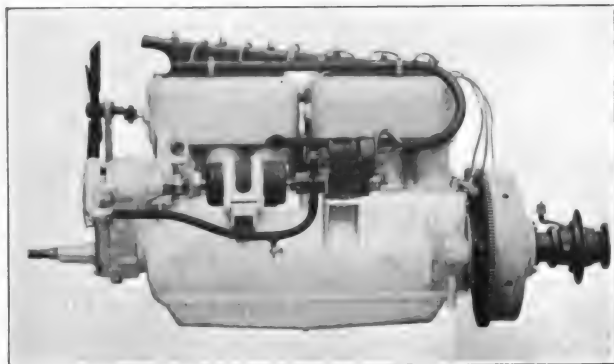
This roadster will carry three people comfortably without the disadvantage of the third person being far from the front compartment and outside the protection of the top. There is an aisle between the two sections of the divided

seats at the rear of the car. The top is a one-man type with natural wood bows and all metal parts nickel plated.

The four, five and seven-passenger bodies are changed in appearance, chiefly by the adoption of a new style of upholstery. These bodies are made with rolled top sides, with the upholstery fastened flush with the inside, so that it is invisible in a side view. No tacks show, as the upholstery is made fast by molding just inside the rolled top of the body. The lines about the back of the rear seat, which has a greater pitch than

formerly, suggest the double cowl.

The cowl has been raised and widened and the width of the front seat increased. The pedals



The Six-Cylinder Motor Used in Previous Marmon Cars and Continued in 1916 Models.

are set slightly further forward to give the driver additional leg room. Instead of bringing the side of the body back from the cowl with a gradual curve, there is now a sharper angle, that affords greater width and more room in the front compartment.

A rain vision windshield is continued as standard equipment, the only difference being that the upper glass is set out of line, so that it overlaps the lower glass and makes the shield water tight.

The six-cylinder L head motor used in previous Marmon "41s" has been continued almost without change. It is a Marmon design with

4¼-inch bore and 5¼-inch stroke. The crank case is a one-piece aluminum alloy casting of the barrel type. The crankshaft is mounted on seven main bearings and is hollow to meet the needs of the Marmon forced feed system of lubrication.

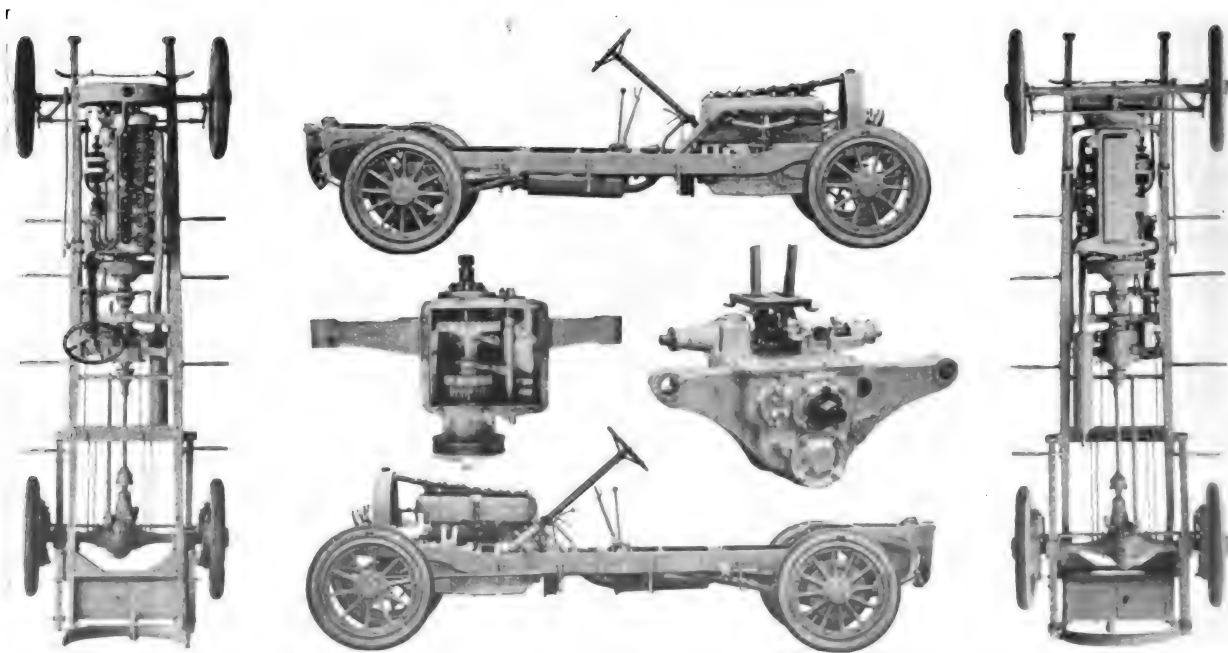
The camshaft is mounted on eight bearings and is carried in a closed tunnel, running submerged in a circulating bath of oil, which insures complete silence and perfect lubrication. The pistons have three rings at the tops and have oil holes drilled around the circumferences.

Forced Feed Lubricating System.

The Marmon forced feed, hollow crankshaft lubricating system, has been improved this year by the addition of a bypass around the circulating pump, which opens automatically when the motor is throttled for slow speed, and reduces the pressure by which the lubricating oil is circulated. This prevents an excess of oil entering the motor at low speeds, prevents smoking and tends to keep the cylinders from becoming foul with carbon. When the throttle is opened the oil pressure automatically increases, assuring a sufficient supply.

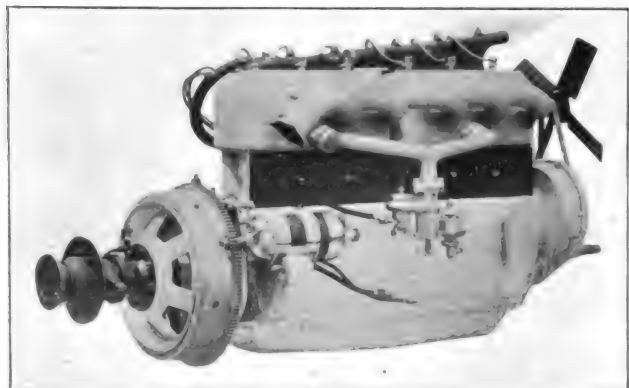
The oil pressure gauge has been changed to record a maximum of 60 pounds pressure instead of 12 pounds indicated by former systems. The pressure is intended to be varied to meet the needs of hot or cold weather, and if the oil is heavy or light. But under extreme condition 60 pounds may be used if desired.

* The gear pump of the lubricating system de-



Group View, Showing All Sides of the Marmon Chassis and Views of the Transmission Gearset, Front and Rear.

livers the oil through the hollow crankshaft direct to the seven bearings. Holes in the shaft register with grooves in the bearings, allowing



Another View of Marmon Motor, Showing the One-Piece Aluminum Crankcase of the Barrel Type.

the oil to flow through the shaft into the connecting rod and piston pin bearings, and through the hollow tappets to supply a cushion of oil against the lower ends of the valve stems as the valves are raised. This system of lubrication was first developed in Marmon cars in 1903 and has since then been used. It is not only economical of oil, but has also proved to be dependable.

The latest type of Stromberg carburetor with hot water jacket and hot air attachment is used. Ignition is a Bosch dual type. This year instead of having an automatic ignition switch on the cam gear cover, which closes when the crank is pushed in—should starting by hand be necessary—a throw switch has been placed on the toe board. This throw switch is also used for grounding the current when stopping the motor.

The clutch is the Marmon special cone type, which has long been used in the Marmon "41," and has been equal to every test of service. It permits a yielding engagement, which is smooth and effective. There are five spring steel discs within the cone of

the flywheel, which yield gradually as the clutch spring pushes the aluminum cone into complete engagement. The spring engages the entire inner surface of the flywheel.

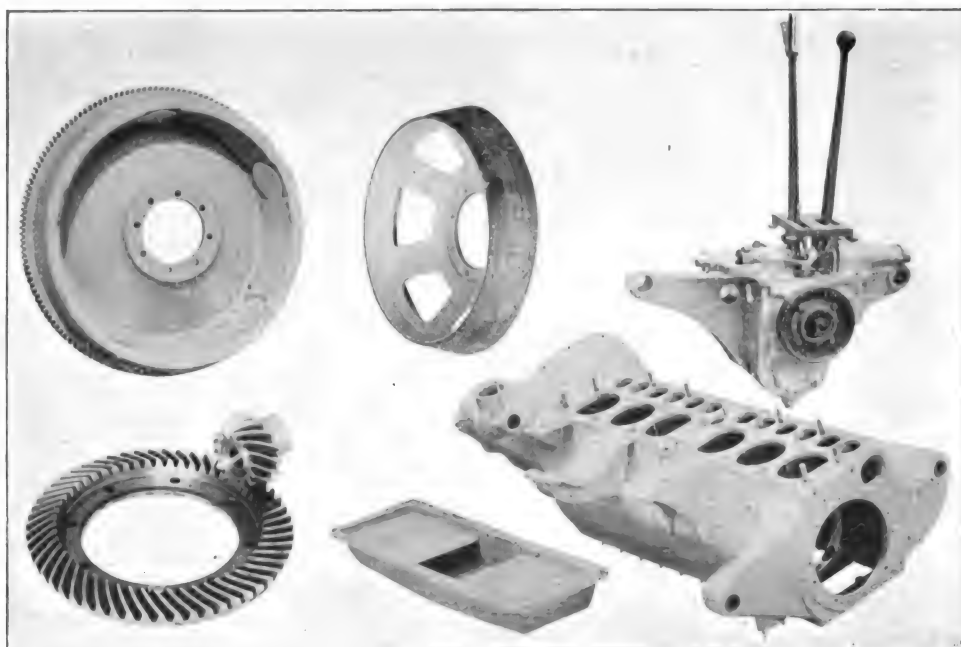
The transmission gearset, which has three forward speed ratios and reverse, is a selective type that was designed and is built in the Marmon shops. The gearset case is mounted on a flexible three-point support, similar to the mounting of the motor. This relieves it of strains that may be caused by the weaving of the frame.

The rear axle is a full floating type, with pressed steel housing. This year it is fitted with a spiral cut bevel driving gear, the standard gear ratios being as follows: Speedster, 3.06:1; roadster, 3.5:1; four-passenger touring car, 3.5:1; five-passenger touring car, 3.77:1; seven-passenger touring car, 3.77:1.

Details of the Chassis.

The differential gearset and the wheels are mounted on conical roller bearings. All models have a wheelbase of 132½ inches. The springs are of a self-lubricating type. The front springs are semi-elliptic, two inches wide and 39 inches long. The rear springs are three-quarter elliptic, 2¼ inches wide by 57 inches long. Each of the four springs is equipped with a shock absorber.

Goodrich Silvertown Cord tires are used as standard equipment. The sizes are 36 by 4½ all around. The seamless steel gasoline tank,



Special Cone Type of Marmon Design, Transmission Gearset Built in Marmon Shops, Crankcase Casting and Splash Pan and the Spiral Cut Bevel Driving Gear.

with capacity of 22 gallons, is suspended from the rear end of the frame.

The complete electrical system of the car is furnished by the Bosch Magneto Company. This consists of the dual system of ignition already mentioned, a 12-volt Bosch lighting generator and a high efficiency Bosch starting motor, which is automatically connected by a piston to the ring of the flywheel when the electric starting switch is closed.

All wiring and connections, as well as lamps, bulbs, switches and regulators are furnished by the Bosch company. The Willard storage battery is used.

The new cars come in the following models: Speedster, three-passenger roadster, four, five and seven-passenger touring cars. Each model lists at \$3250 with the exception of the seven-

the Cambria Steel Company, at its plant in Johnstown, Penn.; the Carnegie Steel Company, at Farrell, Penn.; the Republic Iron and Steel Company and the Youngstown Sheet and Tube Company of Youngstown, O.

It is reported that 444 coke ovens are now being used to produce benzol. Comparative tests indicate that the American product is slightly better in quality than the German. American producers hope to be able to retain, after the war, the markets they have won in France, Great Britain, Spain and Italy.

ELECTRICAL COST VERY LOW.

It costs, in ordinary operation, only about one per cent. more for gasoline when a car is equipped with an electrical starting and lighting system, according to Elwood Haynes, the pioneer automobile builder.

At higher speeds this cost is increased and it may reach as much as seven per cent., according to the type of system used. The six-volt system is now used on 85 per cent. of the cars. The Maximum output of the generator is usually reached at about 20 miles per hour, and it ranges around 15 or 16 amperes.

The ordinary generator turns into electrical power about 60 per cent. of the power drawn from the motor. With a car that uses one gallon of gasoline every 18 miles, the

cost for the electrical system on a 100-mile trip would be about three cents.

WHITE 'BUSSES TO CLIMB PIKES PEAK.

The old cog railway to the summit of Pikes Peak is to have competition this summer from a motor 'bus line running up a newly completed highway to the summit of America's most famous mountain.

For this service 12-passenger 'busses on a truck chassis and seven-passenger touring cars will be supplied by the White company of Cleveland. The new road is 17 miles long and 20 feet wide, with no grades exceeding 10 per cent.

Only one road in this hemisphere surpasses this one in altitude reached and that road, crossing the Andes in Bolivia, is also the route of a White bus line.



Train One and One-Third Miles Long Loaded with Overlands for C. T. Silver Motor Company, New York City, Valued at More Than \$330,000.

passenger touring car, which sells for \$3350.

AMERICAN BENZOL EXPORTED.

One of the results of the war, which has shut off the exportation from Germany of products which were formerly sent all over the world, has been the production in America, in large quantities, of benzol used in compounding dyes and explosives.

This material, for which the world formerly relied on Germany, is now being exported from America. Before the war the price was 25 cents a gallon, but it now has gone to \$1.25 a gallon, with a likelihood that it may go still higher.

Some of the largest steel companies, which operate coke ovens, have gone into the production of benzol with a view to making it a permanent branch of their business. Among these are

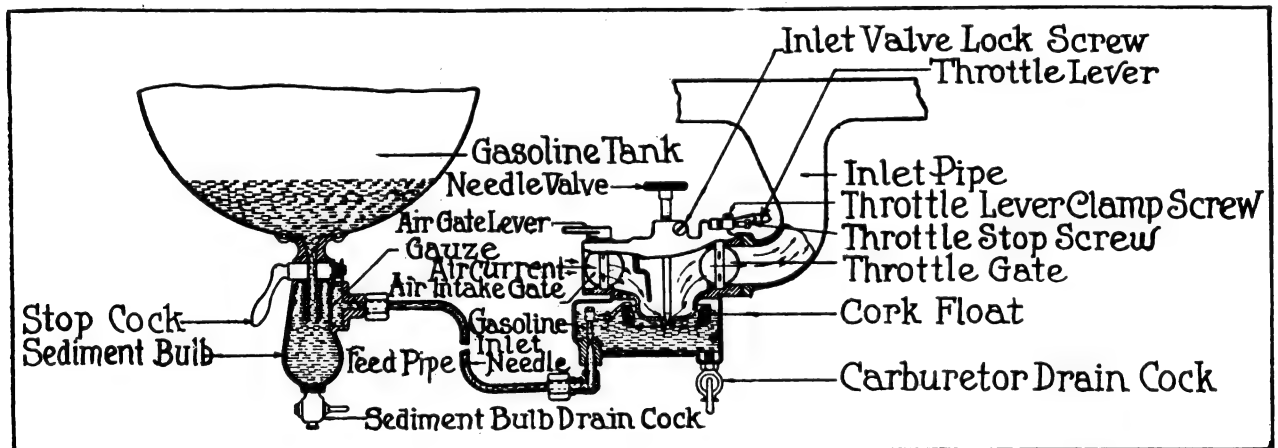
SUGGESTIONS FOR THE FORD CAR OWNERS.

Theory of Carburetion of Hydrocarbon Fuels—Simplicity of the Gasoline Supply System and the Carburetor Used with the Model T Power Plant.

The 26th article dealing with the construction, operation, maintenance, care and repair of the model T Ford chassis is devoted to the consideration of the theory of carburetion and description of the types of carburetors used with this machine.

THE reader understands that the fuel is drawn into the cylinders through the intake manifold, and that the movement of the atmosphere through the carburetor and intake may be likened to pulsation—that is, it is intermittent, and there is no steady flow. Referring to the suction stroke, which valve is opened when the piston is $1/16$ -inch below top centre and closed when the piston is $9/16$ -inch past bottom centre, one notes that the valve is open for $4\frac{1}{2}$ inches of the eight inches of piston travel for each

terially affect the efficiency of the expansion stroke, the one being the degree of compression and the other the proportion of gasoline vapor in the fuel. With the valves seating as they are designed to seat there ought to be no loss of pressure in the cylinder unless there should be leakage about the piston rings, and if these are correctly fitted and the lubrication is sufficient the compression pressure ought to be maintained without perceptible change for a number of minutes. Instances are frequent of such pressure being but little reduced after the expiration of hours. The motor is designed to be practical for the purposes for which it is used and no attempt has been made to obtain the results that



The System by Which the Gasoline Is Supplied from the Tank to the Holley Carburetor and the Different Components of the Instrument.

crankshaft revolution, and for this reason the suction strokes overlap. In other words, the piston of any cylinder will draw fuel simultaneous with the piston of the cylinder succeeding it in the firing order from the point $1/16$ -inch past bottom centre to the closing of the valve. But as one valve will be closing and the other opening, there will evidently be diminished suction in the intake manifold during a part of each stroke.

Volume of Fuel Is Unchanged.

The proportions of the combustion and the expansion chambers of the motor are fixed and cannot be changed, and the volume of fuel mixture that is drawn into the cylinders is not variable, but there are two conditions that will ma-

might be sought with more costly construction.

The fuel is drawn into the cylinders because the movement of the pistons cause partial vacuums in each, but the gas is not under pressure and the volume that is carried into each cylinder depends upon the design quite as much as upon any condition. By this is meant that the proportions and shape of the intake manifold, the size of the valve ports, the clearance of the valves, the carburetor, as well as the other variables, are all essential factors that have been determined as best meeting the standard requirements. There is one fact that must be borne in mind by all owners and operators of machines that are used in high altitudes, and that is that roughly the at-

mospheric pressure is diminished a half pound for each 1000 feet ascent above the sea level. At tidewater the pressure is 14.7 pounds to the square inch, and at 5000 feet or about a mile above that level the pressure would be about 12.2 pounds.

If a machine were taken from the seashore to mountains, at the height stated, the proportions of the combustion and expansion chambers could not be changed, and the compression would be lower and there would be somewhat lessened efficiency at the higher altitude as compared with the lower, but this would apply to compression only, for the volatilization of the fuel would not be affected by the change. Adjustment of the air supplied would be necessary, for the proportions of oxygen and nitrogen vary with increased altitude, and to obtain the highest degree of combustion, or to approximate the condition that

ments are used for varying fuels. That installed on the model T Ford motor, which is being directly considered, is designed for use with gasoline and is adapted for that liquid only, although it might be more or less efficient with other fuels. These are not to be dealt with save with suggestions relative to exigencies that may arise. Gasoline will vaporize in ratio to temperature, freely at or above 60 degrees of heat, and correspondingly slower as the temperature lessens. Other hydrocarbons volatilize more rapidly, and some more slowly, but no other fluid that possesses the same qualities of volatilization, rapid combustion and the real efficiency can be obtained as cheaply.

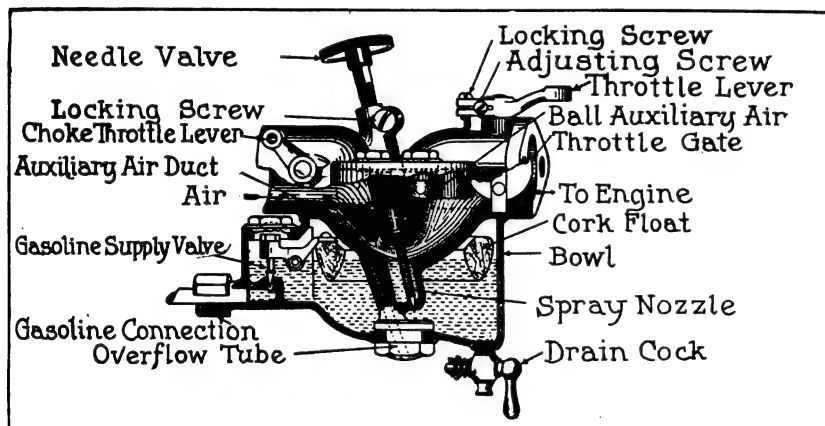
Evaporation is not a sufficiently rapid process for combining gasoline vapor with air in such proportions that a combustible gas will form at ordinary temperatures, and volatilization is

produced by injecting the fluid into the air that is drawn into the cylinders of the engine by the suction strokes. Differing forms of instruments have been devised for this duty, these being types in which the air is sent through the gasoline, the air drawn over wicks saturated with gasoline, the air drawn over a shallow pool of considerable area, or the gasoline flowed slowly in a wide, thin stream in the air current, but these are seldom used, and the more efficient construction, known as the jet carburetor, is

now almost universal equipment.

The general principle of design applies, but the applications of this principle are indeed numerous. In carburetor construction a number of variables must be considered, included specific gravity of gasoline, temperature, altitude, engine design, engine operation and engine condition. Motor efficiency depends, if mechanically well maintained, upon carburetion and ignition, and these functions must be certain and positive. The fuel ought to be supplied in the exact proportions to obtain the greatest useful work with the least consumption.

In automobile practise the gasoline is carried in a tank and it is supplied to the carburetor either by gravity or pressure. The Ford system is a gravity type, and is extremely simple. The fuel supply is placed in a cylindrical tank beneath the driver's seat. At the lowest point of the circumference is placed a bulb, which car-



The Type of Kingston Carburetor Used with the Older Types of Model T Power Plant.

might be satisfactory at tidewater, more air would be required for a given volume of gasoline vapor. This statement is made because these factors might not be considered.

Why a Standard Carburetor.

One can well emphasize that conditions are not so extreme as to justify the manufacture of motor vehicles specially adapted for differing altitudes, and with the model T Ford car, which is standardized throughout, departure from standards would be costly and would not be demanded by a sufficient number to warrant the changes in design. There is, of course, variance in vaporization of fuel with the changes in temperature, which is provided for carburetor adjustments, both for gasoline and air, but this condition differs materially with that of altitude.

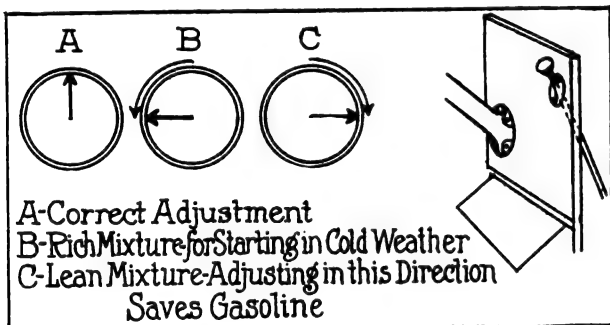
Function of the Carburetor.

The function of the carburetor is to quickly volatilize the fuel, and different types of instru-

ries near the top a shut off cock, and at the base a drain cock. Below the shut off cock is an outlet to which the copper fuel supply pipe leading to the carburetor is attached. A long nipple from the shut off cock projects into the bulb below the outlet for the fuel, and the outlet contains a piece of fine wire gauze. The purpose of the bulb is mainly to filter gasoline, the heavier foreign matter and water being precipitated in the base, where they may be removed through the drain cock, while the wire gauze prevents any substance passing to the carburetor.

Ford Fuel Supply System.

The illustration of the Ford system shows a carburetor now used with Ford cars, that does not have an auxiliary air inlet, while the other illustration shows the carburetor with an auxiliary air inlet. The latter types were used on the earliest model T engines. The carburetor shown in the illustration of the system is a Holley, which is very simple and has but one adjustment, that



The Finger Wheel Controlling the Carburetor Air Gate and its Different Adjustments.

being a needle valve. The other carburetor is a Kingston.

The principle of this instrument is that it consists essentially of two chambers, the float chamber, to which the gasoline is admitted from the tank through the supply pipe, and the bowl or mixing chamber. Referring to the illustration of the system, one will note that there is a constant level or gasoline in the float chamber, for if the float is lowered the gasoline needle at the inlet is raised and the fuel will flow into the chamber until the rising of the float seats the needle and stops the flow. The bottom of the mixing chamber is slightly below the level of the gasoline in the float chamber, and a very shallow pool of fuel will remain in this mixing chamber when the carburetor is not in use and at slow engine speeds.

How the Air Is Impregnated.

The air is drawn through the inlet of the carburetor and is deflected downward by a baffle

(When Writing to Advertisers Please Mention The Automobile Journal.)

Mossberg Guaranteed SMALL CAR TOOLS

O
S
B
E
R
G
•
G
U
A
R
A
N
T
E
E
D
•
T
O
O
L
S



An ideal
set for
light car
users

\$2.00



Small Car Socket Wrench Set No. 17
Ford Reverse and Brake
Pedal Wrenches

12c

Single End



S. E. Reverse Brake and Cylinder Head Wrench No. 640
Ratchet Reverse Wrench

50c

Best
Adapted

Ratchet Reverse Brake Pedal and Tension Spring
Wrench No. 645, No. 7454.



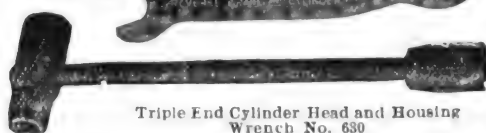
The "Old Necessary"

10c

Ford Hub Cap
Wrench No. 650

Kit Wrench for FORD and Metz

16c



Triple End Cylinder Head and Housing
Wrench No. 630

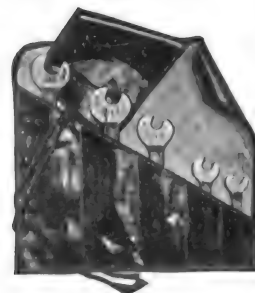
Almost indispensable on cylinder head and Axle
Housing Nuts because the sockets are tapered **26c**



25c

Valve Grinder
for Ford

The Logical Valve
Grinder



FORD
Engineer's Set **\$1.00**

FRANK MOSSBERG CO.
ATTLEBORO, MASS.

If your dealer cannot supply you, we will ship prepaid on
receipt of price. Send for Catalogue No. 171 E.

plate directly upon the surface of the gasoline, and as the opening through which the air must pass to contact with the fuel is smaller than the inlet, the velocity of the air is increased. Striking the surface of the gasoline the air becomes impregnated with the vapor, and it is then drawn upward, following the outlet of the carburetor to the intake manifold, through which it passes and is supplied to the engine cylinders. This process applies to slow engine speeds. As the motor revolutions increase the condition differs somewhat.

The suction of the pistons in the cylinders will cause a reduction of pressure between the cylinders and the carburetor, and the velocity of the air passing through the carburetor inlet causes an additional drop of pressure at seat of the needle valve in the base of the mixing chamber. The result of this lessened pressure at the needle valve seat, which corresponds to the spray nozzle of other carburetors, a small jet of gasoline is thrown into the air around the needle by the atmospheric pressure upon the surface of the fuel in the float chamber. With increased movement of the motor the suction becomes almost continuous, and the gasoline spray impregnates the air.

Great Rapidity of Carburetion.

The rapidity of the operation of the carburetor through this variance of atmospheric pressure is very great, for with the engine making 1500 revolutions a minute and two explosions to the revolution, this would require 3000 separate impulses upon the surface of the gasoline in the float chamber, or 50 a second. The reader will understand that with so much and so accurate work to do good carburetor results cannot be obtained save by great care in adjustment and in keeping it free from substances that might affect its efficiency. The volume of gasoline that is supplied to the mixing chamber is governed by the needle valve, and too much or too little fuel will have very perceptible effect upon engine operation.

The number of cylinders that can be supplied fuel by a single carburetor is not a matter that need be discussed here, other than to state that eight cylinders or more have been operated by efficiently with one instrument, and with a maximum speed of 2400 revolutions and four explosions to the revolution, this is a total of 9600 separate carburetor impulses a minute, or 160 a second, from which one may judge that the operation and adjustment of the Ford carburetor is exceedingly simplified. There is but one adjustment—the needle valve, and the turning of the finger wheel on the dash varies the supply of air. Note should be made of the positions of the finger wheel, which may be turned a half revolution

in either direction, that operates the air gate of the carburetor.

Position for Best Operation.

There is a position for the needle valve where it will supply the best proportion of fuel for the air that will be aspirated through the carburetor, and this can best be determined by the operation of the motor. This position will vary somewhat according to conditions, but when it has been set the adjustment ought to afford reasonably satisfactory operation. If the highest efficiency were required, an expert might adjust a carburetor frequently, for sometimes the slightest change might for the time being cause an increase of power or economize fuel, but such fine adjusting is not essential to ordinary service. When once set good judgment will dictate no change so long as the engine gives sufficient power.

When this adjustment has been made there will be a position for the finger wheel where the engine will show the best work. When this has been found a file mark should be made on the finger wheel that will mark the exact top of the circumference. This will indicate the normal position the wheel should be placed in. In lower temperatures and for starting, when a "richer" mixture is desired, the finger wheel should be turned from right to left, which will close the air gate, increasing the proportion of gasoline that is carburetted in passing through the carburetor, so that the fuel will fire more quickly. This will increase the gasoline consumption, so when the machine has been started the finger wheel should be turned to the normal position.

Operating with Lean Mixtures.

But in some circumstances better operation can be obtained by turning the wheel from left to right, opening the air gate and lessening the proportion of gasoline, and the wheel should be turned to a point where it will supply exactly the volume of air that will best serve. The wheel should be kept at that point until the operation of the motor indicates that it should again be changed.

The operator should remember that after a carburetor has been adjusted the needle valve should not be changed until necessary, but the air adjustment can be varied as frequently as is desirable. The slightest change of the air supply may make considerable improvement and the adjusting should be done slowly and carefully. This statement, however, does not apply to starting, when generally a rich mixture is best, although not so rich a mixture that ignition is not possible.

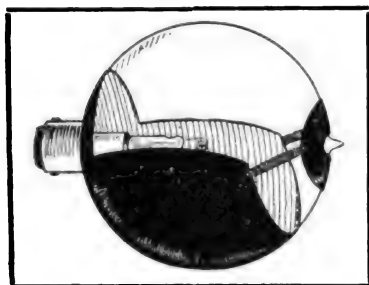
(To Be Continued.)

FORD CAR ACCESSORIES AND EQUIPMENT.

HOUSEL AUTO SPECIALTIES.

Quality Accessories and Equipment That Increase the Convenience and Efficiency of Automobiles.

Indicative of the merits and low prices of the extensive line of specialties manufactured and distributed by the W. E. Housel Company, Buffalo, N. Y., is the Perrin



Perrin "No Glare."

"No Glare," which eliminates all headlight glare without decreasing the volume of light rays. It fastens around the lower half of the electric bulb, and also has a section covering the extreme end of the bulb, fitting over the tip. The price per set is \$1.

Another distinctive specialty is the detachable fan belt for Ford cars. It is made of high-grade leather

and is ready to be attached. Installation is simple, one end being fitted with a pair of hooks that set into the two eyes at the other end of the belt. The price is 50 cents.

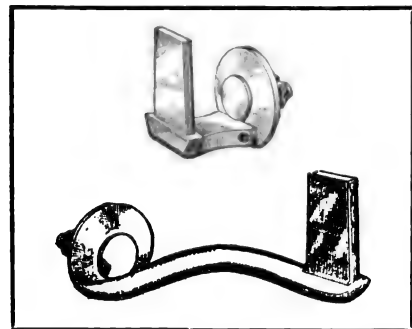
A gasoline gauge for Ford machines is another accessory of special interest. A gauge, having figures corresponding to the gallon capacity of the tank, is attached to the dash of the seat. An indicator is mounted on the gauge and attached to a float in the tank. A feature of this device is that the operator not only can ascertain at a glance how much fuel remains in the receptacle at any time, but also can be certain when purchasing gasoline that he is receiving full measure. It is accurate in action, and cannot get out of order. The equipment sells for \$1.

There are many other quality specialties made by the Housel company and they are fully described and the discounts given in the company's literature. Immediate attention will be given inquirers who mention this magazine in their letters.

NEW TYPE OF OIL LIGHT BRACKETS.

Malleable Iron Brackets for Ford Cars Which Will Take Any Make of Oil Lamp.

A new system of attaching regular types of oil lamps to the 1915 Ford car has been produced by the Superior Lamp Manufacturing Company, 136 West 52nd street, New York City.



Superior Side and Tail Lamp Brackets.

It is not necessary to use a bolt-on type lamp after these brackets are put on, as any make of lamp can be used by this simple change. The advantage of this is that the car owner can use any lamp he desires, and the

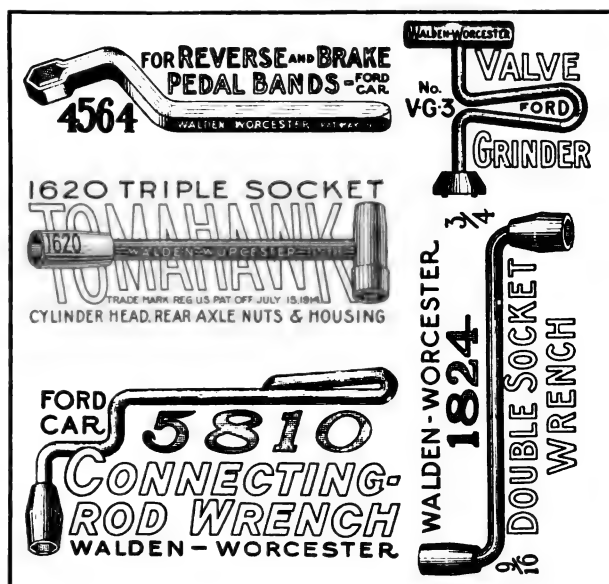
jobber and dealer, who may be stocked heavily with ordinary lamps, can dispose of them by selling in combination with the brackets, which will fit the 1915 Ford car.

The Superior 1915 Ford brackets list at \$1.50 per set of three pieces, from which price an attractive discount is allowed the trade. Detailed information can be obtained from the company by those who mention this publication when writing.

WALDEN-WORCESTER WRENCHES.

Five Tools Essential for Ford Car Equipment That Permit of Easy Adjustment of Inaccessible Nuts, Etc.

One of the high quality combination wrench sets which the Walden Manufacturing Company, 60 Commercial street, Worcester, Mass., is producing for the Ford car is designated as No. 5 set, and is shown on this page. The set includes a wrench designed particularly for the



Walden-Worcester No. 5 Set of Service Wrenches for Ford Cars.

reverse and brake pedal bands; the peculiar shape of the handle provides ample working space at all times. The double socket wrench is designed to fit the main bearing and engine base bolts, as well as several others. The sizes of the sockets are 9/16 and 5/8 of an inch.

The valve grinding tool is all steel, the bar handle of which swivels on a cone bearing, while the pins that fit the valve head are extra hardened. Several purposes are served by the tomahawk wrench, it being designed for the bolts of the cylinder head, rear axle and housing, water intake pipes and many other parts. The connecting rod wrench permits the adjustment of the rods in practically any position without the necessity of removing the motor from the car.

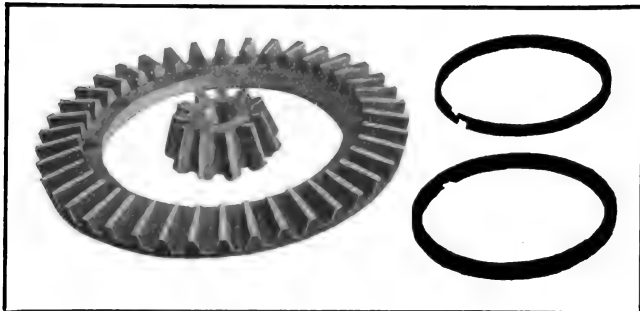
The tools are made of the best material and are fully guaranteed. The retail price of the set is \$1.75.

PARTS FOR FORD CARS.

Repair Parts for Ford Cars Supplied to Dealers and Repairmen at Cut Prices.

The Grossman Auto Parts Company, White Plains, N. Y., is prepared to supply dealers and repairmen with a complete line of repair parts for Ford cars at cut prices.

The quality and accuracy of all parts are warranted. Some of the several articles offered and their prices are as follows: Differential ring gears, \$3; differential pinion



Grossman Ring and Pinion Gears and Piston Rings.

gears, \$1; front radius rods, \$2; rear axle shafts, \$1.75; driving shafts, \$4; plain piston rings, 10 cents; triple piston rings, 60 cents; front springs, \$2.80; rear springs, \$8.40; engine valves, 12 cents.

The company also carries a stock of gears, springs and piston rings for over 40 makes of cars. A complete list and cut trade prices of the various parts distributed by the Grossman company will be sent on request when mention is made of the Automobile Journal.

APCO REDUCES PRICES.

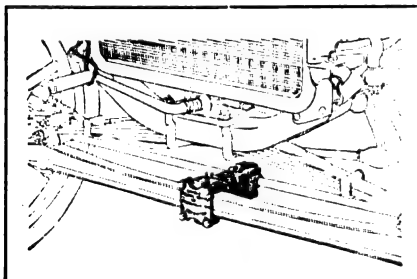
The List Price of the Apco Muffler Cut-Out and the Valve Stem Adjuster Has Been Reduced.

Announcement is made by the Auto Parts Company, Providence, R. I., maker of the widely known and used Apco specialties for the Ford car, of a reduction in the list price of its valve stem adjuster and its muffler cut-out. The adjuster will retail at 20 cents each, and the cut-out at 45 cents each. Inquiries addressed to the company should mention this publication, which will assure prompt attention.

SAVIDGE FORD STEERING DEVICE.

Savidge Steering Device Company Marketing an Appliance for Safe Steering of Ford Cars.

The Savidge Steering Device Company, 32-34 East Georgia street, Indianapolis, Ind., is manufacturing a device which holds the front wheels of a Ford car to a



Savidge Steering Device Installation.

straight-ahead position. This appliance attaches at one end to the centre of the front axle, and at the other to the centre of the tie rod. The main mechanism consists of a strongly coiled spring, partly enclosed. At the end nearest the axle is fitted a steel roller,

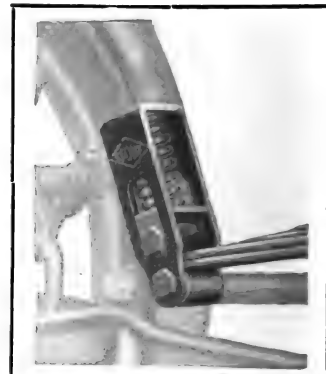
seated into a depression in the clip. When the car's course is changed this roller moves up the sides of this depression, and thereby compresses the spring. As the latter is very strong the tendency is at all times to keep the roller seated and thus maintain the straight position of the wheels. The pull of the spring is never excessive.

The device also eliminates rattling of the steering gear and prevents any wobbling of the wheels, thereby saving tire wear and making driving safe over all road conditions. Attachment is by six bolts. It is imperative when installing this that the front wheels should be in true alignment with the rear. The retail price is \$4.90.

STONE SHOCK ABSORBER.

Widely Known Company Manufacturing a Set of High-Grade Shock Absorbers for Ford Cars at \$4.50.

The Universal Rim Company, 1301 Michigan avenue, Chicago, Ill., manufacturer of the well known Baker rims, is producing a high-grade shock absorber for Ford cars. This device employs a large coil or cushion spring, capable of much faster vibration than the main or leaf spring. This feature makes it possible to rapidly absorb the jolts of rough roads before they can reach the body springs.



Stone Shock Absorber.

When a set of four is installed on the car, the body is suspended on highly sensitive coil springs, which compress in proportion to the amount of weight placed upon them. Compression ceases at the point where they are strong enough to support the load. The maker has listed this instrument as the Stone shock absorber.

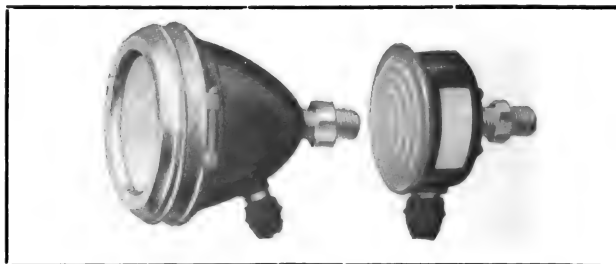
The yoke and saddle, the parts which carry the load and strain, are pressed from solid pieces of high carbon, cold rolled, quarter-inch steel, which produces a frame work of greater strength than any requirement that they will be called upon to meet in regular service. The coil cushion spring is made from fine analysis steel and is held permanently secure by the yoke and saddle. Installation is very simple and can be quickly accomplished by the average individual. A set of four, complete with new spring bolts, is retailed at \$4.50.

SUPERIOR ELECTRIC LAMPS FOR FORDS.

Special Type of Electric Side and Tail Lamps Especially Designed to Fit 1915 Ford Cars.

The Superior Lamp Manufacturing Company, 136 West 52nd street, New York City, manufactures special Ford bolt-on electric side and tail lamps especially designed and constructed to fit all Ford 1915 cars. A screw and nut arrangement forms a support and part of the lamps, and fits directly into the flanged bracket projecting from the windshield.

The lamps are well designed and attractive. They are finished in black and brass, and can also be obtained in black and nickel finish if specified. The designs are new and distinctive.



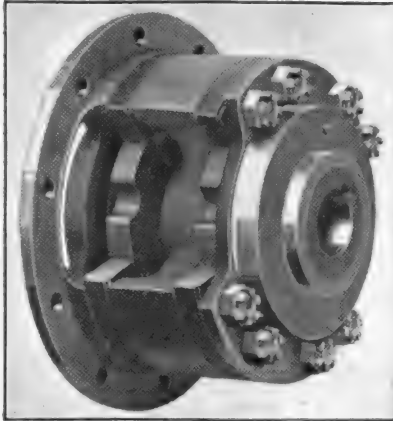
Superior Bolt-On Electric Side and Tail Lamps.

The Superior bolt-on side lamps list at \$4.50 per pair, and the tail lamp at \$1.20 each. The company always maintains a large supply in stock and is prepared to make immediate deliveries. It is advisable that dealers apply promptly to the company for its list of net prices, which allow a liberal discount to the trade.

Another fast selling product of the company is a set of bolt-on round oil lamps, consisting of two side lamps and a tail lamp of the new Ford type. Further information will be sent to those who mention this publication.

GEARLESS DIFFERENTIALS.**Gearless Differential for Ford Rear Axles That Involves New Principle of Driving.**

The gearless differential for rear axles for Ford cars, made by the Gearless Differential Company, Detroit, Mich., is now being manufactured under license for the manufacturing trade by the New Process Gear Corporation, Syracuse, N. Y., which is recognized as one of the largest makers of gears in the country, having an annual production totalling more than 150,000 sets of gears.

**Gearless Differential.**

This differential differs broadly from all other constructions of like nature, in that it reverses the principle of driving, so that the slowest moving wheel of the pair driving the machine has the traction, and the vehicle is always driven at the speed of the slowest wheel.

Power is the direct cause of automobile skidding, and where a machine is light and has large engine capacity, as has a Ford car, there is always a material danger for passengers, vehicular and pedestrian traffic, and for property, that cannot be avoided, no matter what wheel equipment is used to insure traction. This danger is one factor, but in addition to this there is the expense of fuel and lubricants, of car upkeep and repair, as well as tire mileage, all of which are largely influenced by the character of traction of the machine.

The gear differential applies the power to the fastest moving wheel, when turning a curve or a corner. When a wheel is momentarily lifted from the ground, or loses traction on a soft or slippery surface, this has a tendency to turn the vehicle in a circle, with the slowest moving wheel as the pivot.

Even when the machine is moving practically straight ahead and the traction wheels leave the ground for any cause whatever, such as contacting with a slight obstruction, and when traction is again effective, the car is thrown forward, causing sideways. This excessive speed of the power wheels is especially destructive of tires as well, and the stresses upon the machine causes extreme vibration that necessarily wears the vehicle to a degree proportionate to the speed and the surfaces of the highways on which it is used.

The gearless differential in action is very simple. The traction wheel that is moving fastest, as when turning a corner, is released to turn on its axle, as do the front wheels, and there is constant power applied without the throwing and the extreme variation from the gear driven axle. The gearless differential, model T, is designed especially for Ford cars. It is easily installed in a comparatively short time, and is sold with the guarantee that it will endure during the life of the car without breakage. The purchaser has the option of a 30 days' trial, and the price will be refunded without questions if the equipment is not satisfactory. Thousands of these differentials are in use and have been found to be extremely safe and economical.

BEVERLY-COTTON AUTO BODIES.**High Quality Bodies That Make New Cars Out of Old and Provide for Both Commercial and Pleasure Purposes.**

Providing equipment for the conversion of pleasure cars into commercial vehicles and club cars is a specialty in which the L. M. Cotton Company, 922 Commonwealth avenue, Boston, Mass., has won wide recognition. The

latest product is known as the Beverly-Cotton body, which is designed to be mounted upon the Ford or any other chassis.

In keeping with the company's other products, only the best materials obtainable have entered into the construction of these bodies. Built of matured and ash woods, they combine strength with beauty of lines. By using white wood, covered with the most expensive roofing material, for the top, lightness has been obtained.

The three-seated body provides a variety of adaptations. With the three seats installed it supplies a fine club car or private omnibus for theatre or station use. Take out the two rear seats and the body becomes a spacious delivery vehicle. In either case the interior is protected by storm curtains of the best oiled duck. The body is supplied with either three, two or one seat, and with or without the top. Cushions are of box construction, with curled hair and steel construction, affording great riding comfort.

These bodies provide a solution to the second-hand and the hard-to-sell car problem. Instead of scrapping the old chassis, it could be equipped with a Beverly-Cotton body. The hard-to-sell car could be converted into a new machine by mounting one of these bodies, which will not only aid in disposing of them, but will sell at a higher price than the original car, in many cases.

The Cotton company carries more than 50 models in stock, and between 350 and 400 bodies of all colors, which insures prompt shipments. The retail prices range from \$75 to \$125, and considering the value received the bodies are very moderately priced. Mention of this publication when writing will insure considerate attention.

CONOVER COWL-WINDSHIELD.**A Streamline Cowl and Automatic, Rain Vision, Ventilating Windshield Designed for Ford Cars.**

The Conover Cowl-Windshield, which the Malton Specialty Company, 755 Boylston street, Boston, Mass., is offering, contains several features that are designed to

give the Ford car a distinctive streamline appearance and added comfort. The effect of the cowl is seen in the accompanying illustration, as is the automatic, adjustable windshield.



The cowl is a single-piece steel stamping, made in a 200-ton press, and is equal in design to the most advanced body work. It is black enamelled to match the color of the body, and encloses the front of the Ford car and protects the coil and dash fittings from rain and dust.

Conover Cowl-Windshield Assembled on a Ford Car.

The windshield is in two sections, without cross bars to impede the vision. By slightly tilting the top section, the driver has rain vision, he being able to look under it through the opening thus made. The lower section can be tilted inward so as to direct the wind created by the motion of the car into the driver's compartment, a feature which tends toward cooling that compartment, which in some cars becomes heated by the engine underneath. The windshield is automatic, both sections remaining firmly fixed.

The combination of cowl and windshield retails at \$15, f. o. b. the factory at Adrian, Mich. Its attachment is comparatively simple, it requiring no fitting and it being secured in position by bolts. The Malton Specialty Company will supply further information to inquirers who mention this publication when writing.

PRACTICAL FACTS FOR NEW CAR OWNERS.

Five Common Tire Troubles and How to Avoid and Repair Them—Readers' Queries—Suggestions as to Repairs and Operation.

MOST any garage or repair man firmly believes that the average car owner or operator knows less about the proper care of the tires than he does about any other part of the automobile—and he is justified in this belief in the majority of cases. It seems strange that so essential a feature of the machine should not have the same concentrated study applied to any other component of the car.

An official of the B. F. Goodrich Company, one of the country's leading tire builders, states that in the matter of tires alone, over 75 per cent. of the user's troubles arise from misuse, and he sums it all up with the words "neglected trifles."

ly unless the fault is corrected. In one case where the axle was slightly bent, both front tires wore through and the inner tubes blew out before the car had covered 50 miles.

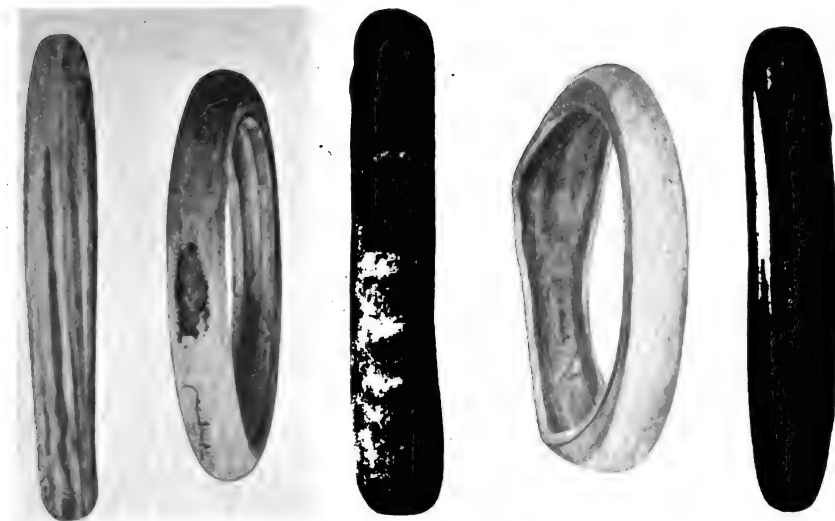
Until the new car has become tuned up, the steering gear may become effected, and this should be watched for very closely. In fact, the alignment should be examined by a competent person at least once every two months. To aid in steering, the front wheels are permitted to "toe in" slightly, but if allowed to do so to any marked degree, this worn condition of the tires is certain to occur.

In repairing such a casing as shown, the only practicable method is to have a new tread applied. Examine the fabric to see if any of the plies are worn through, in which case they should be reinforced before applying the tread.

The results of sudden application of brakes and skidding are shown in the second tire. This condition is common in hilly and mountainous districts, but even there it could be avoided to a large extent by proper braking methods. In this illustration it will be seen that the tread and several plies of fabric have been scraped off, but, as serious as the case appears, reinforcement of the fabric will not be necessary unless one or more

plies have been worn through. If the rubber has been scraped off in only one or two places, it can be patched and retreading will not be imperative.

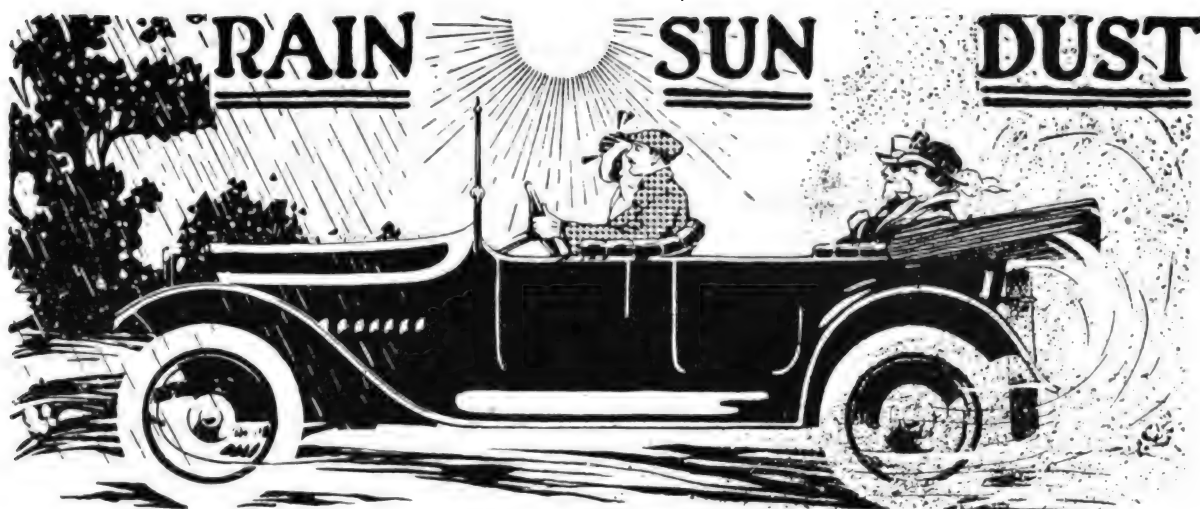
The centre illustration shows the result of one of the most common faults—running the tire too soft, or underinflated. It is about this condition that the manufacturer of tires lays the greatest emphasis. The user, not properly understanding that he must keep his tires properly inflated in order to derive full benefit from them, is apt to malign the builder for the troubles which are solely due to the fact that the user forgot to



Five Common Tire Troubles—Left to Right, Faulty Alignment, Skidding and Braking, Underinflation, Abuse of Inside Protectors and Neglected Cuts. (Photograph by Courtesy of the B. F. Goodrich Company.)

On this page is illustrated five common causes of tire break down. Reading from left to right the illustration shows the results of faulty alignment, of skidding, of underinflation, of the abuse of inside protectors, and the ultimate result from neglected cuts.

The first of these is a very common condition, and is caused by the wheels being run out of alignment, usually prevalent on the front wheels. The cause is the improper adjustment of the steering apparatus, or a bent knuckle or axle, and in either case the tire will deteriorate very rapid-



Weather Does Not Injure Cars Protected With **JOHNSON'S PREPARED WAX**

"The Weatherproof Body Polish"

Take your car through rain, sun and dust, and bring it out as brilliant and lustrous as when you put the finishing touches on it in the garage. And the reason is that **Johnson's Prepared Wax**

"Sheds Water Like a Duck's Back"

It imparts a hard, dry gloss over the entire body of your car, building up a shining veneer that will not crack or check.

Several coats of **Johnson's Prepared Wax** will revive that appearance of newness, though the varnish on your car may have become rough from wear.

In many cases the timely use of **Johnson's Prepared Wax** saves the expense of having cars revarnished.

Imparts a Hard, Dry Finish, Unaffected by the Hottest Sun

Your car, properly treated with **Johnson's Prepared Wax**, will virtually go through fire and water—and come out unscarred. The hardest rain will not dim its mirror-like polish. The hottest sun has absolutely no effect on its smooth, glossy coat.

Does Not Collect Dust

Johnson's Prepared Wax imparts a perfectly hard, dry, glasslike polish to which the dust cannot adhere. It is quite different from the many oily polishes on the market which gather and hold every speck of dust.

Johnson's Prepared Wax is clean and easy to apply and inexpensive. Increases the value of your car on the market, and gives you the prestige that comes with the appearance of prosperity and class.

One Pint by Parcel Post 60 cents—
enough for a season's use.

Send 10c for Sample Can of
Johnson's Prepared Wax, suffi-
cient for one application on
a large car.
Agents Wanted

S. C. Johnson & Son

"The Wood Finishing Authorities."

Racine, Wis.



S. C. JOHNSON & SON,
Racine, Wisconsin

AJ

I enclose 10c for a can of Johnson's Prepared Wax—sufficient for one polish on a large car.

Name.....

Address.....

City & State.....

My Accessory Dealer is.....

(When Writing to Advertisers Please Mention The Automobile Journal.)



"DON'T GAMBLE WITH DANGER!"

NO brake is good unless it is perfectly adjusted and well lined. Any owner can adjust brakes, but he must depend absolutely upon the quality of the brake lining he uses.

Staybestos Improved Brake Lining has all the qualities that protect lives and property, it is extremely enduring, and measured by service it is the cheapest brake lining made.

No owner can afford to gamble with safety when the difference in price between cheap brake linings and Staybestos is so trifling.

DEMAND AND INSIST ON
(IMPROVED)



NEW UNIVERSAL Ford Transmission Lining

We will send a trial set of three linings for Ford transmission bands, cut to length, with rivets, ready to attach, for 50 cents; these usually sell for 75 cents or \$1.

"SOMETHING MOR'N COTTON."
STAYBESTOS MFG. CO.
Germantown, Philadelphia, Pa.

Makers of
Asbestos, Rubber Packings, Gaskets and Radiator Hose

Write for full
particulars



**Why Freeze Yourself?
Ruin Your Auto?**

The Superior Safe Garage Heater

SAFE. NO FUMES.
NO GASES

Equipped with pilot light. No
matches, no danger, no discomfort.
An ideal positive heater.

SUPERIOR MANUFACTURING CO. N. S. Pittsburgh, Pa.



Patented
"S" PISTON RINGS
McQUAY-NORRIS MFG. CO.

In Use on Over
300,000
Automobiles

"ASK THE USER"

Dep't D, ST. LOUIS, MO.

There's no leak proof ring but the **LEAK PROOF** Ring — insist

F. SHIRLEY BOYD

175 Massachusetts Ave., Boston, Mass.

R. I. V. Ball Bearings.

Baldwin Chains and Sprockets.

J. H. Sager Line.

HOTEL LONGACRE

Broadway & 47th Street

**More Like a Club Than a Hotel
Exclusively Bachelor**

Convenient to Everything. The refined air and
good service of a club.

RATES PER DAY

50 rooms with lavatory....\$1.00

150 rooms with private bath 1.50

50 rooms with private bath 2.00

Two-room Suites, \$3.00 to \$4.00

Special Weekly Rates

Restaurant a la carte.

Club Breakfasts.

Dining room Open to Ladies.

**The best value in New York City
both in rooms and restaurant.**

Phone, 7790—Bryant

J. G. BOGGS.

(When Writing to Advertisers Please Mention The Automobile Journal.)



Power with beauty, speed with grace—these added to faultless design and craftsmanship have produced the masterpiece of motor travel—

Victory

Scripps-Booth

In this car the modern genius for mechanics combines with classic ideals of form and harmony—the result is Victory. Victory over riding-troubles—victory over useless cost—victory in the consciousness that you ride with the maximum of mechanical perfection, luxury and taste.

Proof in demonstration can be had at the local salesrooms.



Scripps-Booth Co.
Detroit, Mich.

pump a little more air into the tube. Every tire builder supplies an inflation table, and to this the user should adhere strictly.

When a tire is either overloaded or not inflated to standard, the weight of the car and load descends not upon the confined air as intended, but upon the side walls of the casing. They weave back and forth somewhat like the waves of the sea, and create a friction and heat that in effect will devulcanize the best make of tires. The fabric plies become separated in spots, leaving the corrugated appearance noted in the illustration and allowing the layers to pull in divergent ways with resultant strains upon the inner tube. The result—a blow out.

The whole structure deteriorates under the strain and any of several results—blisters, rim cuts, bulging, etc.—will soon cause the tire to be sent to the junk heap, and if the same inattention is given its successor that too, and all following, will soon break down without the user deriving the full value of his money. Aside from that, the manufacturer will frequently be blamed, when he is absolutely innocent.

The fourth tire illustrates tire manufacturers' caution about using inside protectors indiscriminately. One Goodrich official states: "If the

harmful results from the use of inside protectors or puncture-proof bands were fully realized, few of them would be used in new tires. Protectors should only be employed as a means of prolonging the life of old and practically worn out tires. While they may accomplish all they are represented to do in staying or preventing punctures, yet their use is so injurious as to offset this feature. A tire is scientifically made and the adding of any number of plies of fabric is detrimental. The employment of an inside band not only reduces the resiliency of a tire, but the additional thickness creates heat, which is not only destructive to the fabric, but weakens the adhesive qualities of the rubber between the plies of fabric and blistering follows."

To repair such a tire as shown, reinforcing the inside with new fabric will prove serviceable if the practise has not endured long or the injuries are not too severe.

Neglected cuts is a fitting title to the fifth illustration. This tire shows blisters resulting from neglect of two small cuts extending to the fabric. Fabric deterioration and tread blistering is bound to result from neglect. Mud, dust and gravel are certain to be sucked into the cut and to grind and bore into the tire at every revolu-

(When Writing to Advertisers Please Mention The Automobile Journal.)



SPEDOLENE solves the problem of automobile and motor truck gear lubrication. One trial is all we ask. "A fair field and no favor" will demonstrate to your satisfaction that **SPEDOLENE** is the King of all lubricants for gears.

Henry H. Kroh, Boston Distributor.
MANUFACTURED BY
Continental Asbestos Corporation, Worcester, Mass.

MOTOR PARTS COMPANY OFFICIAL BOSCH DISTRIBUTOR

Zenith Carburetor Mohawk Tires Leak-Proof Rings
185-187 Columbus Avenue, BOSTON
818 No. Broad St., PHILADELPHIA SPRINGFIELD, MASS

Peerless Quality in Smaller Size

"ALL PURPOSE" FOUR AND SIX
FOUR AT \$2,000 (Sixes \$250 Extra)

THE PEERLESS MOTOR CAR CO., CLEVELAND, OHIO
Makers also of the "48-Six" and Peerless Trucks.
Licensed under The Kardo Patents.

AUTOMOBILE ELECTRIC LIGHTING SPECIALTIES

For the Automobile Owner and Manufacturer
who wants SERVICE for his money

ELECTRIC LIGHTING SPECIALTIES Made to Order
CULVER-STEARN'S MFG. CO.
Worcester, Mass. Detroit, Mich.

Meet me at the
Tuller



For Value,
Service, Home
Comforts

New HOTEL TULLER Detroit, Michigan

Center of business on Grand Circus Park. Take Woodward car
get off at Adams Avenue.

ABSOLUTELY FIREPROOF

200 Rooms, Private Bath, \$1.50	Single, \$2.50	Up, Double
200 " " " 2.00	" " " 3.00	" " " "
100 " " " 2.50	" " " 4.00	" " " "
100 " " " 3.00 to 5.00	" " " 4.50	" " " "

Total 600 Outside Rooms. All Absolutely Quiet.
Two Floors—Agents' New Unique Cafes and
Sample Rooms Cabaret Excellence

(When Writing to Advertisers Please Mention The Automobile Journal.)

tion until the tread becomes loosened. Moisture enters and rots the exposed fabric. Immediate repair will avoid any and all these troubles, and this repair can be made by the use of plastic compound or gum, such as is sold for such repair work.

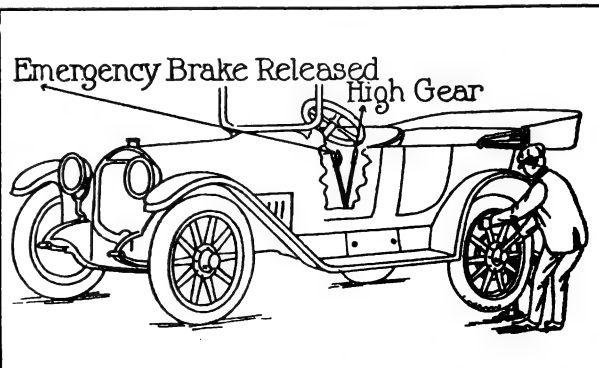
(To Be Continued.)

READERS' QUERIES.

Suggestions to Owners on How to Start a Car Without a Crank, Testing Spark Coils, Short Circuit and Adjusting Wheels.

Crank Pin Breaks—G. J. L., Canisteo, N. Y.

Recently, while touring through the country, the crank pin on my six-cylinder car broke, and I was unable to start the motor. As the car was too heavy to push, I had to be towed by a pair of horses while I applied the high gear and thus started the motor. I would



Method of Starting Motor Without Crank.

like to know if there is not some other method by which the car may be started should this misfortune ever occur again.

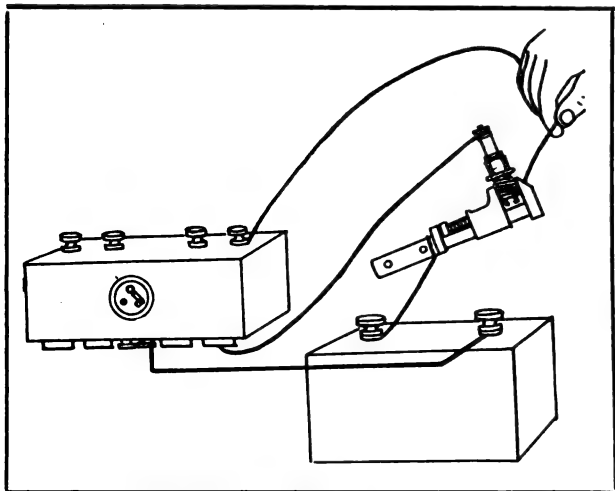
The only comment to offer is that you could have accomplished the desired result without the aid of the horses. One of the rear wheels should be raised by means of a jack and the high gear engaged. The brakes should then be released and the elevated wheel turned in a forward direction. Of course when the motor starts this wheel will spin, but upon placing the shifting lever in neutral, it will stop. This action is accomplished through the differential, the mechanism responding to the member affording the least traction. The accompanying illustration shows the method described.

Testing Spark Coils—H. L. T., Harrisburg, Penn.

I recently overhauled my four-cylinder roadster and as I am in doubt as to whether the coil is all right, I would like to know if there is not a method of testing it without having to place it on the machine and connect all the wires. It is of the four-unit type and no magneto is employed.

The coil may be tested as shown in the accompanying illustration. This method utilizes a battery, four wires, a spark plug and an ordinary monkey wrench. Two wires are secured to the battery terminals, one to the positive, and the other to the negative. A wire is led to the battery terminal of the coil and the switch lever thrown to the right to complete the connection. The other lead is the ground wire and is fastened to the wrench, this component acting in the same capacity as the car frame. The spark plug is then placed within the wrench jaws and the latter set, taking care that the terminal of the plug does not come within at least an inch of the metal.

The secondary wire from the No. 1 coil is then connected to the plug in the usual manner. A piece of wire should now be attached to the primary terminal of the No. 1 unit, and the free end of



Testing the Efficiency of Spark Coils Without Connecting All Wires.

the wire touched to the wrench, thus completing the electrical circuit. If the vibrator is correctly adjusted and the coil is in good condition, a spark should be seen at the air gap of the plug. Each unit can be tested in a similar manner. A spark loses in size when subject to compression in the cylinder, and this must be taken in consideration when testing the coil.

Short Circuit—M. F. T., Waltham, Mass.

Can you explain the reason for the lights of a car flaring up and then going out? After I had run a little further they suddenly appeared again and I have not seemed to have any more trouble, although some times the lights burn more brightly than at others.

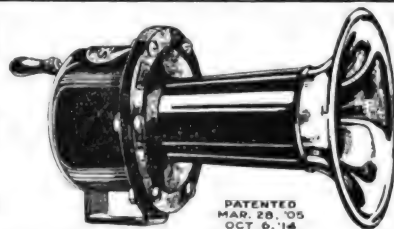
Your experience was probably due to a short circuit of the wiring. The vibration of the car moved the wires so that the bare sections did not touch the conductive object. A short circuit occurs when two wires of opposite polarity come into contact with any conductive material. If the

(When Writing to Advertisers Please Mention The Automobile Journal.)

\$4.00

SEISS

Model A
Double Acting



The Only Hand Operated Horn
With the Motor Driven Sound

At your dealer's or direct from factory—with 10 year guarantee only \$4.00.

SEISS MFG. CO., 445 Dorr St., Toledo, Ohio

Why Pay Excessive Hotel Rates?

THE NEW AMSTERDAM

Euclid Avenue at 22nd Street, CLEVELAND, OHIO

A five minutes walk from the active centres, yet overlooking the most beautiful residence section of Cleveland.

"The logical resting place for tired Tourists."

Large airy suites of from two to five rooms (also single rooms.)

GARAGE NEARBY

RATES:—\$1.50 per day, each person

Dining Room Modified a la Carte

A. A. McCASLIN, Managing Director

L. McNAMARA, Manager

23% MORE GAS
TANKII
FREE TIRES
EXACTLY WHAT IT SAYS
AUTOMOBILE PLEASURES
are only imaginary without the use of
TANKII
Prevents Carbon --- Augments Power

WHY NOT ?

A More Efficient Motor
A More Reliable Motor
More Miles per Gallon
25 per cent More Power
More Speed as Required
Reliable Long Distance Running
Forget Your Engine Troubles

Don't envy a smooth running motor, use TANKII and have one.
100 TANKII tablets in convenient box, sufficient to treat 100 gallons gasoline. Price **\$1.00**

If your dealer cannot supply you, write
TANKII CHEMICAL SALES CO., 224 High St., CLEVELAND, O.

TRADE MARK
Raybestos
REG. U.S. PAT. OFF.

"THE ORIGINAL AND BEST ASBESTOS BRAKE LINING"

THE ROYAL EQUIPMENT CO., BRIDGEPORT, CONN.

THE MOTOR TRUCK

**A Recognized Authority in the
Commercial Vehicle Field**

12 ISSUES

\$2.00 THE YEAR

DIXIE 20TH CENTURY MAGNETO

With DIXIE equipment there is no bothering with batteries—no careful nursing when position of advance lever is changed—just a high-tension magneto, self-contained and independent, which *penetrates* its charge with a *full* spark at the lowest as well as the highest speeds.



SPLITDORF
Electrical Co.

NEWARK, N. J.

(All SPLITDORF features are fully covered by patent or patents pending)



BALL BEARINGS, REGROUND
at one-fifth the cost of new, also New Single Row Annular, Thrust, New Departure Double Row and Radax Bearings.

AHLBERG BEARING CO.

Boston Chicago Detroit New York
Los Angeles Cleveland St. Louis, Mo.

VALVOLINE OIL CO.

Heavy, Medium and Light

Automobile Oils

27 STATE STREET BOSTON, MASS.

ALDING PORCELAIN PLUGS



Regular
75c Value

50c
EACH

Write for a gallon of the famous
"ALDING" Oil, in "DUCK" Can, 75c Delivered
ALSTEN & GOULDING COMPANY
26 Foster Street, Worcester, Mass.

(When Writing to Advertisers Please Mention The Automobile Journal.)

ground did not exist for any great length of time. I do not believe that much current was drawn from the battery, although it does not require a great length of time for a short circuit of this kind to totally discharge an ordinary battery. Examine the wiring immediately to locate the uninsulated part, and then wind a large amount of tape around it. The lights remaining dim at times is probably due to a slight short circuit still existing. A battery will not hold its charge under this condition and often will completely deteriorate over night.

Adjustment of Front Wheels—J. T., Pasadena, Cal.

I have a 1912 Ford touring car, the front wheels of which wobble so that I cannot run in a straight line. I recently made a trip through the mountains where the roads were uneven, but I used care and took my time. Can you tell me how I can correctly adjust them?

It is probable that the wheel bearings are worn. The wheels should be jacked and an attempt made to rock the members by gripping them at the top and bottom. If play exists it will

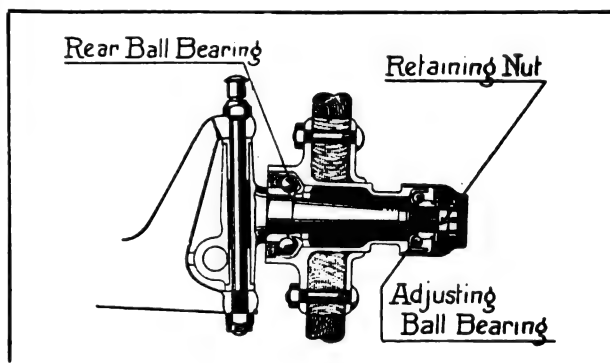


Diagram of Ford Wheel and Steering Knuckle.

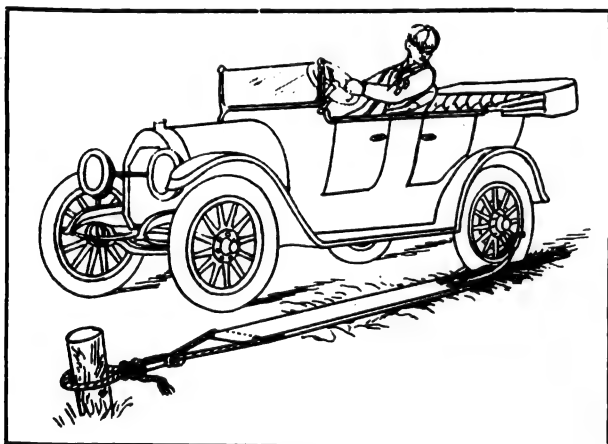
be found either in the ball bearings or at the spindle bolt. The accompanying diagram of construction will aid you in making the adjustment with comparative ease.

When the spindle bolt is found to be loose, the play is usually caused by worn spindle bushings, and these must be replaced. Worn bushings are generally the result of improper lubrication. If play is still found after the bolt has been made tight, it may be located in the hub bearings. Take off the hub cap and remove the cotter pin, after which the lock nut may be unscrewed.

The adjusting bearing can now be screwed into the hub, thus pushing the wheel further on to the stationary ball bearing at the back. Care should be taken not to have the adjustment too close, as the wheel should be allowed to rotate freely. When replacing be sure to place the cotter pin through the lock nut.

EXTRICATING A STALLED CAR.

A positive method for extricating a stalled car is illustrated herewith. It is so simple that the average individual can make the device shown, to be carried about in the car for emergencies. It consists of a length of canvas, about 10 feet long and 12 inches wide. At one end secure two short lengths of strong rope and at the other a hook for the attaching of a cable or chain. When the car loses traction, the two short ropes are fastened around the rim of the spinning wheel and the cable attached to the hook at the other end. The cable is then made secure to any convenient fixed object—a strong staple driven into the ground will suffice. The car should then be started and the wheel will instantly regain traction by winding up the canvas and thereby being compelled to move forward.



A Positive Means of Regaining Traction in Mud and Sand.

When canvas is not procurable, a discarded leather belt will serve the purpose.

PRIMING THE MOTOR.

In priming the motor the inexperienced car operator is apt to inject too much gasoline, which makes it almost impossible to start the engine operating. The reason is that a sufficient amount of air cannot be drawn through the carburetor to form a suitable explosive mixture. The flooded condition can be overcome by opening all the relief petcocks and briskly turning the engine over, which operation will admit the required amount of air. The petcocks should be immediately closed when a sharp hiss is heard and the engine again turned over against compression.

It has been found by practise that an efficient way to prime the carburetor is to saturate a sponge or cloth with gasoline—never use waste,

(When Writing to Advertisers Please Mention The Automobile Journal.)

Bosch

Advice For You

A GOOD ignition system is a necessary part of every motor car engine. Battery systems, alone or as a part of another system, cannot be expected to retain that essential feature of absolute reliability which an ignition system should have. Use a magneto, a BOSCH Magneto. It's sure.

Be Satisfied Specify Bosch

Correspondence Invited

BOSCH MAGNETO CO.

204 W. 46th St., New York

Over 300 service Stations

Dealers—Saving Blowouts Wins You Trade



Big Profits in Accessories

Here is an important selling fact. Thousands of dealers have learned this simple way to increased business. It is done through sales that win big customers for you. Suggest to your customers ways to save them tire troubles. Take a Goodyear Tire Plaster. Explain how easily it is applied. Tell them how it prevents needless blowouts. Show them that they are cheap in price, but not cheap in quality or service rendered. This is the way to win confidence, to build reputation, to win sales and profits.

There is big profit to you in accessory sales if you handle a line that stays sold because of satisfaction. Learn all about the Goodyear line of 22 Tire Savers. Write today. Address Desk 46.



The Goodyear Tire & Rubber Co., Akron, Ohio

Makers of Goodyear Automobile Tires (2439)

ON YOUR NEXT DUSTY TRIP—



insure your health and comfort by breathing

"O-ZEL-O"

en route. A continuous application of antiseptic air, checkmates dust germs, prevents respiratory diseases, affords instant relief to sufferers from Catarrh, Asthma, Hay Fever, etc. The very principle of "O-ZEL-O" is such that it is impossible to breathe it into the lungs without results. Let us tell you about it.

THE O-ZEL-O CO., Dept. A-54, FT. WAYNE, IND.

HARRIS

TRADE MARK REG. U.S. PAT. OFF.

OILS AND GREASES

DOES SHE SMOKE?

Well, she ought not to. No matter whether she is old or young, your car can be properly lubricated. Smoke means that your lubricant is being wasted—that carbon is depositing on piston heads and valves.

You will find, by using pure HARRIS OILS, that the smoke nuisance can be eliminated. That is one of the reasons why so many dealers recommend them.

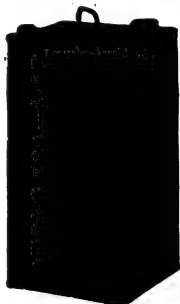
Sold in Bbls., Half Bbls., 10 Gal.,
5 Gal. and 1 Gal. Cans.

"A Little Goes A Long Way And
Every Drop Counts."

A. W. HARRIS OIL CO.

326 S. Water St.,
Providence, R. I.

Branch: 143 No. Wabash Ave.,
Chicago, Ill.



DIXON'S

GRAPHITE GREASE NO. 677

For Transmissions and Differentials

reduces friction to a minimum. Booklet No. 210-G.

Made in Jersey City, N. J., by the

JOSEPH DIXON CRUCIBLE COMPANY

Established 1827

G. 40

Tarvia

**PREVENTS DUST
PRESERVES ROADS**

Booklets on request

BARRETT MANUFACTURING CO.

New York, Chicago, Philadelphia, Boston, St. Louis, Cleveland, Cincinnati, Pittsburg, Detroit, Birmingham, Kansas City, Minneapolis, Salt Lake City, Seattle.



SAMPSON FOR INNER TUBES

PUNCTURE

"It Plugs the Hole and It Hugs the Hole."
Quickly and permanently repairs the
puncture.

PLUG

"One little tool and your hands" is all you
require with it.

STEVENS & CO., 375 BROADWAY, NEW YORK

REXO III \$3.85

The GARFORD MANUFACTURING COMPANY, 2506 Olive St., ELTRIA, O.

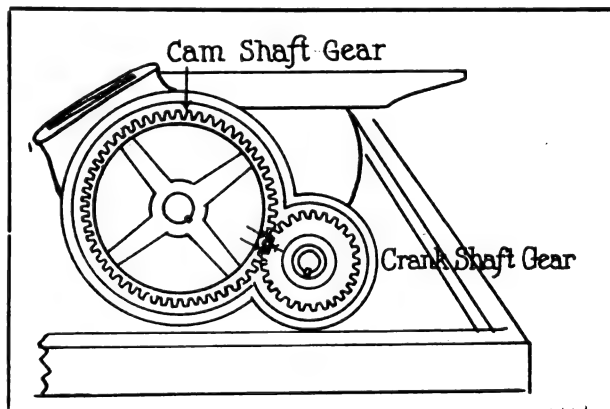
Successors to THE DEAN ELECTRIC COMPANY

When Writing to Advertisers, Please Mention The Automobile Journal.

from which particles may become detached and drawn into the carburetor—and hold it over the air intake. This method has been found even more satisfactory than using the primer.

MARKING TIMING GEARS.

An important factor that should be remembered when removing the camshaft or crankshaft, is to determine whether or not the timing gears are marked. As a rule these are marked when fitted at the factory, but if not, it can be done by means of a centre punch, as shown in the accompanying illustration. This insures that the parts will be replaced in their correct relative positions. While the process of timing may not be difficult to the experienced repair man familiar with the firing order of the cylinders and the interpretation of the markings on the flywheel, yet it may cause the novice a great deal of study and delay, which could easily be obviated by taking



Marking Timing Gears to Insure Accurate Reassembly.

the precaution mentioned above. This principle can also be carried out when disassembling other parts of the motor, such as cylinders and pistons, where it is essential that the same members be reassembled with exactness.

CLEANING THE NEW CAR.

The 1915 model cars are without question the best finished cars ever made. It is not too much to expect such a car to retain its fine finish for at least two years if proper care is taken. Mud should not be allowed to remain over night, especially for the first month, because the finish is not seasoned and the particles of dirt may grip to the surface.

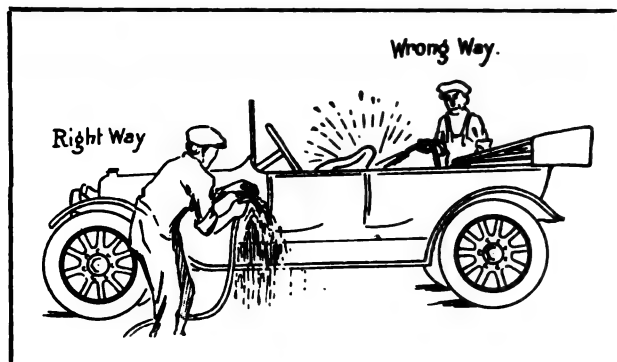
It is a good plan to do as much washing as possible without the use of soap. When the use of the latter is necessary, only pure soap should

be employed. This may increase the cost a trifle, but will more than repay the owner by the results obtained.

Particular care should be taken in the removal of grease and oil, especially if they have become hardened. Gasoline or kerosene may be used if necessary, although the former is preferable, as it quickly vaporizes and does not allow dust to adhere.

There is also a right and wrong method of applying the water to the parts. Never apply the stream with force, as this tends to drive the small particles of dirt into the surface and will frequently cause the varnish to chip. The best method is to flush the surface with a gentle stream of water, after which the sponge may be applied, always keeping the water ahead of the sponge and taking care to see that no particles of grit accumulate under the sponge.

A habit to be discouraged is the touching of the finely polished surface with the tips of the fin-



A Valuable Suggestion to Owners on Washing Cars.

gers. The oily secretions from the inside of the hand leave their traces and if not washed off at once will remain permanently. When it is desired to touch the surface the back of the hand should be used. This method is employed by painters to test paint and varnish. Only a soft cloth should be used for polishing.

MAINTENANCE OF BRAKES.

• Brake bands are subject to wear and after a period of service will either become inefficient or altogether useless. Consequently it is advisable to examine the brake bands if the wheels do not readily respond when the pedal is depressed. The wear may sometimes be compensated by adjustment of the brake rods.

Examination often shows that grease, or oil, from the differential has lodged on the bands, in which case either can be removed by applying kerosene. Sand or dirt should never be allowed

(When Writing to Advertisers Please Mention The Automobile Journal.)

POLARINE DOESN'T MIND THE HEAT

Polarine stands up—holds its body—when most oils have become as thin as water. It is the ideal oil for summer weather.

Polarine

The Standard Oil for All Motors

With the lubrication needs of all standard makes of cars now practically identical, it is only necessary to get **Polarine** to be sure of satisfactory lubrication.

At garages everywhere showing the SOCONY sign—the sign of quality.

STANDARD OIL CO. OF NEW YORK

Principal Stations:

New York	Albany
Buffalo	Boston

**For Gears That Rattle, and That Mesh
With a Grinding Crash Every Time
You Change Speed, Use**



When you put a supply of this lubricant into your housing, you snuff out friction and stifle noise. Your gears mesh in a soft, yielding cushion—metal never touches metal—each tooth is coated with a good bodied lubricant, not merely wet with oil or filmed with grease. Try it.

Reduced Prices for 1915. Ask Your Dealer.



"K. No. 00 Special" grade for sliding gear transmission.

"K. No. 000" for differential, compression cups and all bearings. Avoid substitutes. Look for the orange-colored can bearing sprocket-wheel trade-mark shown above.

**New York & New Jersey
Lubricant Co.**

165 Broadway, New York
1430 Michigan Avenue, Chicago, Ill.

Write today for
our Territorial Agree-
ment on the New

\$1,000

**Inter-State
"FOUR"**

The ONE popular priced car with
the greatest selling arguments
in the country

INTER-STATE MOTOR CO.
804 W. Willard St.,
MUNCIE, IND.

Mea
MAGNETOS



Sole Importers

MARBURG BROS., 1790 Broadway, NEW YORK

**S. R. O.
BALL BEARINGS**



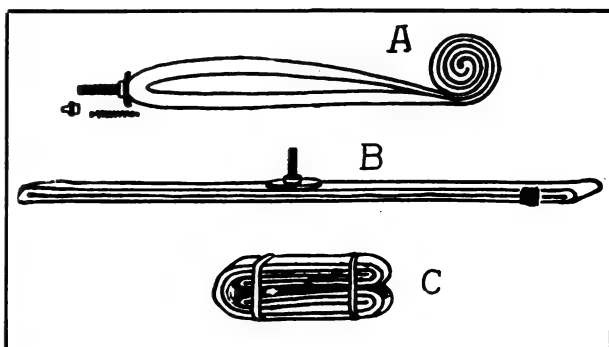
(When Writing to Advertisers, Please Mention The Automobile Journal.)

to remain in the brakes, else they will cause the drum to become cut and roughened. To clean, use kerosene or plain water.

CARE OF INNER TUBES.

A great amount of damage is unquestionably done to inner tubes by not storing them properly in the car. The tubes should be fully deflated and then folded and placed in some part of the machine where they cannot chafe against any other object. The most satisfactory method of folding is one which is extensively adapted by tire builders. The accompanying illustration shows the method. Remove the inner or detachable part of the air valve and beginning at the end furthest away from the valve (A), the tube should be rolled up as tightly as possible. This will expel the air and while the tube is still rolled and held tightly, replace the part of the valve which has been removed.

It is imperative that the valve be replaced at



A, Expelling the Air from Tube; B, Tube Ready for Folding; C, Tube Folded in Flat Package.

this time, as the unrolling of the tube creates a suction. The next step is to open the tube, having the valve standing upright in the centre, as shown at B. Each end can now be folded inward toward the valve and then a second fold made, which will result in the flat package as illustrated at C.

HOME-MADE DRINKING FOUNTAIN.

The new idea in sanitary drinking fountains, wherein the person drinks from a bubbling fountain, can be adapted to the garage or other establishment without cost for equipment. On page 77 is shown an ordinary water faucet turned in the reverse of the ordinary position and the water bubbling out into the sink. If the faucet is desired for other purposes that require it in the ordinary position, it is a simple matter to turn it. The bubbling fountain is becoming generally

recognized as the most sanitary method of distributing water for drinking purposes in public places.

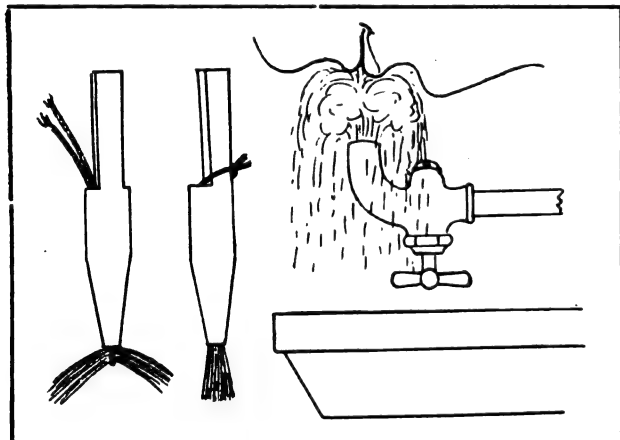
A HANDY CLEANING BRUSH.

Frequently the workman in the repair shop has need of a small brush for oiling or cleaning parts of the car. If one is not at hand a serviceable brush can be made. Pass the looped end of a strong cord through the side opening of an ordinary belt punch as shown herewith. Bristles, or other suitable material, can be inserted in the loop and drawn into the hole, as illustrated.

The string may be tied, thus forming a complete brush.

MEASURING GASOLINE IN THE TANK.

A glass tube, about a quarter inch in diameter, will be found to be a simple, yet accurate,

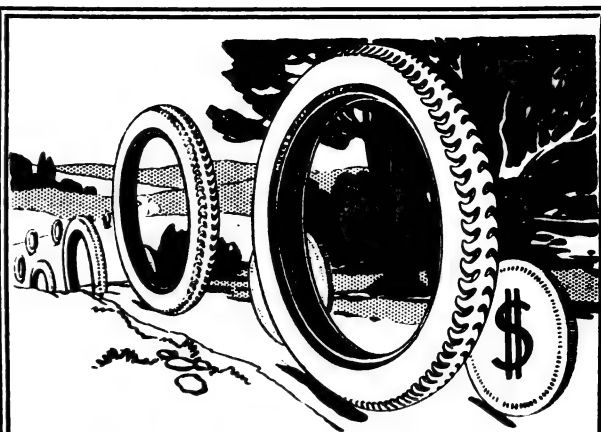


Brush Made from Belt Punch and an Easily Made Sanitary Drinking Fountain.

device for determining the amount of gasoline in a tank. The tube should be long enough to reach from the bottom to a few inches above the cover. Place the thumb over the top opening of the tube when it touches the bottom of the tank and withdraw the tube. The amount of gasoline in the tube indicates the amount in the tank.

KEROSENE AS A FUEL.

Kerosene forms a large proportion of the product obtained by distillation of crude oil. It has been found by test to be superior to gasoline for the amount of heat produced. The chief disadvantage of this liquid for use in the modern gas engine is the difficulty encountered in vaporizing it. It is necessary to greatly raise the tem-



Your Profit, Mr. Dealer,

depends upon the Mileage users get from the tires **you** sell them.

Motorists really ride on dollars because tires are money. The farther tires go, the farther dollars go. The less they pay in the beginning, the more they pay in the end.

Miller GEARED TO THE ROAD Tires

are best for the dealer to sell because they give the user "More Mileage out of his dollar". They do this because the Miller Method of building tires eliminates the guess work. **It retains Nature's vegetable wax and oil in the cotton fabric and preserves the rubber's native toughness for wear on the roads.**

The Miller plan of selling tires—one dealer in a town—gives one dealer all the profit on the tires sold in his territory.

Miller tires sell rapidly because they give most miles on the road. That's why Miller tires are best for the dealer.

Write or wire **now** for our dealer's proposition. It's different and better—just as Miller tires are better.

THE MILLER RUBBER CO.

AKRON

U. S. A.

When Writing to Advertisers, Please Mention The Automobile Journal.

HEINZE



**High Tension
MAGNETO**

FACTORIES
Lowell,
Mass.

BRANCH OFFICES
New York
Detroit

Better
Material
Better
Work-
manship

SALES OFFICES
Detroit
Mich.

BRANCH OFFICES
Chicago
Minneapolis

HEINZE ELECTRIC COMPANY

Make Heinze the Better Magneto

3 Ford Car Accessories for the Price of 1

Choice of any three different articles for \$1.00.
Your money back if not satisfied. Send Money or
Express Order with 10 cents for postage. Our
reference, Westminster Bank, Providence.

Three brake band linings; radius rod adjustable anti-rattlers; improved bow clamps; two steering rod adjustable anti-rattlers; brake rod guides; set headlight bulbs (state year); headlight brace; breather and filler pipe; box assorted cotter pins; coil file; cut-out outfit complete; copper gasket set (12 pieces); fan belt; grease gun; heel rest; set hose connections; set hub caps; jack; box assorted lock washers; four-inch mirror; front number plate holder; quart commutator oil; oil can holder; heavy brass oil gauge; box cementless patches; outside lace patches; inside blowout patches (state size); quart brass polish; Champion spark plug; spring spreader; starting crank holder; valve lifter; valve grinder; valve grinding compound; single, double or triple cylinder head wrenches; adjustable wrench; pliers; three rubber pedal pads; steel wheel puller.

R. & H. CO., BOX 303
PROVIDENCE, R. I.

Thermoid

**HYDRAULIC COMPRESSED
Brake Lining - 100%**

THERMOID RUBBER CO., TRENTON, N. J.

The Fastest Riding
Car in the
World

MARMON

F. E. WING
562 Commonwealth Ave.
BOSTON, MASS.

New England Dealer for

—NORDYKE & MARMON CO., Indianapolis, Ind.—

MARMON "41"
\$3250
132" Wheelbase

MARMON "48"
\$5000
145" Wheelbase

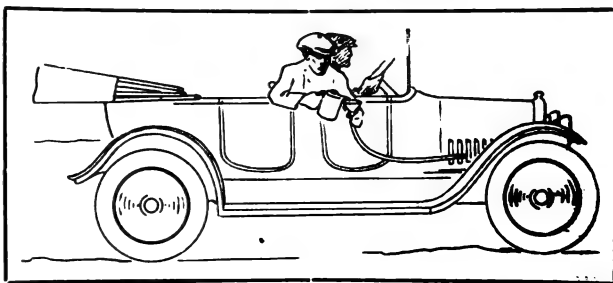
American Made for American Trade
New Departure
Ball Bearings
THE NEW DEPARTURE MFG. COMPANY,
BRISTOL, CONN.

(When Writing to Advertisers Please Mention The Automobile Journal.)

perature of the surrounding atmosphere before a suitable gas can be produced. As kerosene contains a great amount of carbon, there will be large deposits remaining in the cylinders, and the exhaust gases will be much hotter than if gasoline were used. Kerosene cannot be employed as a fuel on high-speed motors on account of difficulty in securing a sufficiently rapid volatilization. Many slow speed stationary engines, however, use this fluid with no difficulty.

EMERGENCY GASOLINE TANK.

The following method of emergency repair, which is frequently resorted to by practical repair men, might be tried when the gasoline tank becomes useless on the road. Disconnect the pipe line leading to the carburetor and fit a suitable length of rubber tubing in its place. This line should be carried through the air vent in the hood and extended to the front seat, at which end a small funnel should be attached. Into this



Simple and Effective Means of Maintaining Emergency Fuel Supply.

funnel a second person can pour the gasoline, as shown herewith, never allowing the funnel to become empty. Of course the funnel must be held higher than the level of the carburetor in order to obtain gravity flow.

GALVANIZING CAST IRON.

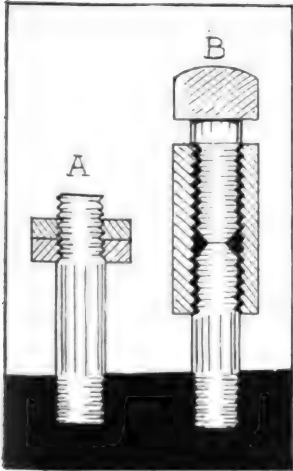
To galvanize cast iron the casting should first be cleaned thoroughly by immersing for a few hours in a bath of one part muriatic acid and two parts water. After removing the work it should be scrubbed with a stiff brush and fine sand and then rinsed with hot water. When the metal is perfectly clean it should be dipped in a solution of one-half pound of sal ammoniac to a gallon of water. It should then be dried quickly and placed in a zinc bath. If the surface of the metal be oily, the grease may be removed by boiling in caustic soda or lye.

ELIMINATING CHATTERING.

When the revolving piece of work in a lathe chatters so that the fine cut desired is destroyed, the trouble frequently can be remedied by placing a piece of leather between the arm of the lathe dog and the side of the face plate slot. If there is sufficient space in the face plate it is advisable to place leather on both sides of the lathe dog.

REMOVING STUDS.

The use of a stilson or pipe wrench in the removal of a stud should be discouraged, as it often results in marring its appearance or the destruction of the thread. These dangers are avoided in the following illustrated and described methods. The first method is illustrated at figure A, and simply consists of locking one nut



Two Methods of Removing a Firmly Set Stud.

against another on the stud thread, the pressure being applied to the lower nut. It may be found necessary to hold the top nut by a spanner wrench to prevent its turning.

Another method is illustrated at figure B, and employs either a square or round piece of steel or bronze, which has been drilled and tapped through the centre, having the same diameter and thread as the stud. A

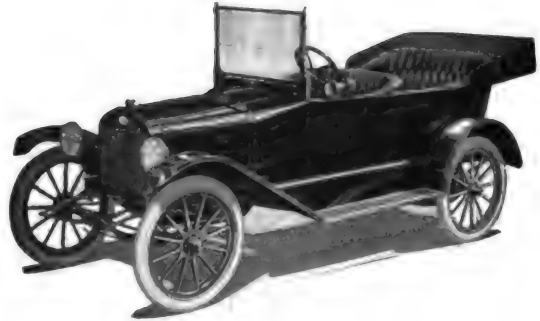
set screw should be screwed tightly against the end of the stud, as illustrated, thus effecting a lock. If the piece of metal used is round, flats should be filed on the sides to give purchase to a wrench. The labor involved in making this tool is more than offset by the fact that it can be used time and again, and utilized as a permanent acquisition to the tool kit.

It should be remembered when recharging storage batteries that the electrolyte produces a gas that is explosive and if ignited may cause serious trouble. For this reason it is advisable to keep a naked flame or a lighted cigar at a reasonable distance away from the charging battery. Care should also be taken to ascertain that all the electrical connections are securely fastened, so that sparks may not escape.

(When Writing to Advertisers Please Mention The Automobile Journal.)

METZ "25"

The Quality Car

**To Dealers:**

Every time a prospective customer balks at paying a thousand dollars for a car, goes away to think it over, and never comes back —you lose a sale.

If you handled the METZ you could make the sale, and he would get just as good a car. If you want proof of this, write us for dealers' particulars. The METZ sells at \$600, equipped complete, including Gray & Davis electric starter and electric lights.

METZ COMPANY, WALTHAM, MASS.

EISEMANN

The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.

The Eisemann Magneto Company

Sales and General Offices,
32-33d St., Brooklyn, N. Y.

New York, N. Y. Indianapolis, Ind. Detroit, Mich.
123 W. 52nd St. 415 N. Capitol Av. 802 Wd'w'd Av.



NEW DOVER TWO-IN-ONE Offset Funnel

New Cone Strainer
New Braced Spout

Removable Spout
Forming a Regular Funnel

Send for New 1914 Catalogue

DOVER STAMPING & MFG. CO.
CAMBRIDGE, MASS.

(4)

The A. J. Automobile Library

(Including All of the Famous A. B. C. Books)

A Complete Library of **\$4.75**
Automobile Mechanics

Transportation Charges Prepaid

Distinct Books—1000 Pages of Text—All Copies Indexed—2000 Illustrations, Including Practical Working Page Charts and Trouble Finders.

Books written by recognized authorities. Especially prepared for those who have to do with the sale, care, repair and operation of motor vehicles, their parts, equipment, accessories, etc.

The practical information in these works cannot be secured through any other series or number of books or for 50 times what is charged for this library.



Engine . . .	35c	Chassis . . .	25c
Magneto . . .	35c	Lighting . . .	50c
Carburetor . . .	35c	Operation . . .	50c
Battery . . .	35c	Overhauling . . .	50c
Tires . . .	25c	Motorcycle . . .	35c

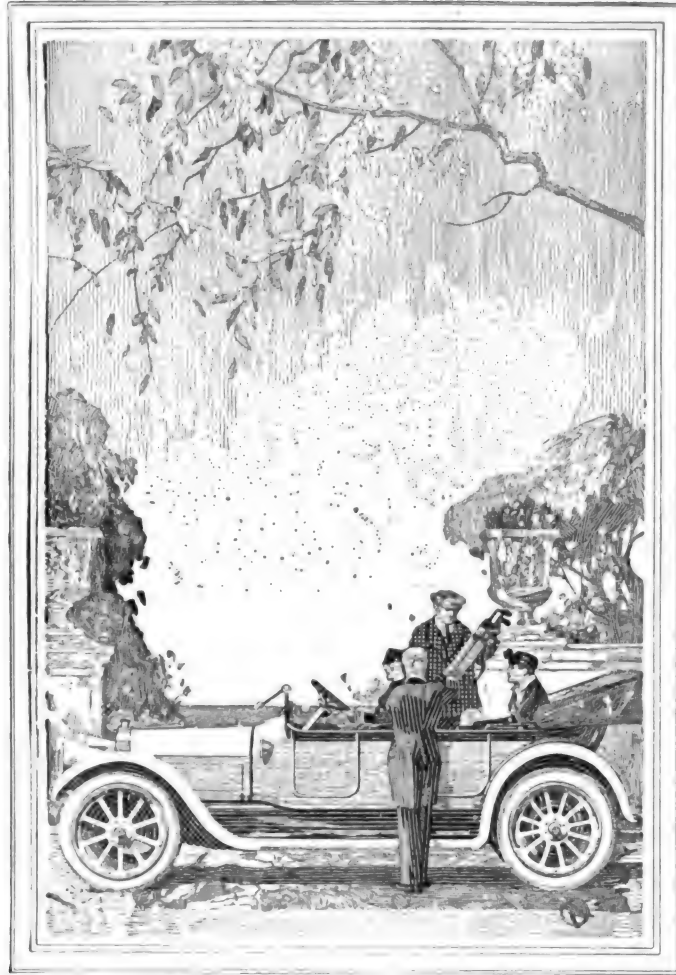
Truck Operation \$1.00

Automobile Journal Publishing Company

Times Building

Pawtucket, R. I.

Pierce-Arrow



Justifiable confidence
rides beside the man who
drives or is driven in a
Pierce-Arrow Car.

The Pierce-Arrow Motor
Car Company *Buffalo, N.Y.*

MULTIBESTOS REG. U.S. PAT. OFF.

Some of the Cars that are Safe in the Grip of Multibestos

Packard	Studebaker	Chalmers
Pierce-Arrow	Maxwell	Reo
Fiat	Locomobile	Metz
Hupmobile	Empire	Chandler
Marathon	Marmon	Haynes
Simplex	Saurer	Pullman
Crane	Independent	Little Giant
Mack	Lauth-Jurgens	Hewitt
Signal	Allen	Seagrave
Knox	Lexington	Staver
La France Fire Engine	Hollier 8	Glide
Pilot		

The Adoption of Multibestos as brake lining or clutch facing on this majority of the cars of real standing offers convincing proof of its high quality— even more convincing when it is considered that that adoption has been the result of competitive tests in almost every case.

Standard Woven Fabric Co.

Factory, Framingham, Mass.

New York Branch and Export Office
1779 Broadway

BOSTON—P. Shirley Boyd, 175 Massachusetts Ave.
PHILADELPHIA—N. A. Petry Co., Inc., 1309 Race St.
CHICAGO—F. E. Sparks, 1436 Michigan Blvd.
SAN FRANCISCO—Fred Ward & Son, Inc., Cor. First and Howard Sts.

MULTIBESTOS REG. U.S. PAT. OFF.

VOL. XXXIX

NO. 11

AUTOMOBILE JOURNAL

\$1.50 the Year
10 Cents the Copy

PAWTUCKET, R.I.

On request we will gladly mail you our complete Chart of Automobile Recommendations, which lists the correct grade of oil for 585 makes and models of cars.



Mobiloils

A grade for each type of motor

The four grades of Gargoyle Mobiloils, for gasoline motor lubrication, purified to remove free carbon, are:

Gargoyle Mobiloil "A."

Gargoyle Mobiloil "B."

Gargoyle Mobiloil "E."

Gargoyle Mobiloil "Arctic."

For Electric Vehicles, use Gargoyle Mobiloil "A" for motor and enclosed chains. For open chains and differential use Gargoyle Mobiloil "C."

In buying Gargoyle Mobiloils from your dealer, it is safest to purchase in original packages. Look for the red Gargoyle on the container. For information, kindly address any inquiry to our nearest office.

VACUUM OIL COMPANY,

Rochester, N. Y., U. S. A.

Specialists in the manufacture of high-grade lubricants for every class of machinery. Obtainable everywhere in the world.

Domestic Branches:

Detroit, Ford Bldg.
Boston, 49 Federal St.
New York, 61 Broadway.
Chicago, Fischer Bldg.
Philadelphia, 4th and Chestnut Sts.
Indianapolis, Ind, Pythian Bldg.
Minneapolis, Plymouth Bldg.
Pittsburgh, Fulton Bldg.

PUBLISHED
by the
**AUTOMOBILE JOURNAL
PUBLISHING COMPANY**

Contents Copyrighted
July 10, 1915
All Rights Reserved

NINTH ANNUAL TOURING NUMBER





**OFFICIAL
BOSCH
DISTRIBUTORS**

**Service
Stations**

Providence, R. I., American Ball Co., 115 Clifford St.
Hartford, Conn., Robert R. Ashwell, 341 Trumbull St.
Bangor, Me., Bangor Motor Co.
Waterbury, Conn., Brass City Auto Co.
Auburn, Me., Darling Automobile Co., 29-37 Turner St.
Ellsworth, Me., Ellsworth Foundry and Machine Co.
Bar Harbor, Me., Ellsworth Foundry and Machine Co.
Dover, N. H., Franklin Square Garage.
Gloucester, Mass., Gloucester Garage.
Newburyport, Mass., Ingalls Garage Co.
Pittsfield, Mass., J & B Mfg. Co.
New Bedford, Mass., William Law Co., 100 Dartmouth St.
Portland, Me., Maine Motor Car Co., Free and South Sts.
Manchester, N. H., B. McGrillis & Son, Bridge and Malvern Sts.
Newport, R. I., Newport Engineering Works, 359 Thames St.
Fall River, Mass., J. Edward Newton Co.
Worcester, Mass., Morgan & Corey, King and Main Sts.
Portsmouth, N. H., Portsmouth Motor Mart.
Nashua, N. H., Pollard Auto Co., 232 Main St.
St. Albans, Vt., St. Albans Foundry Garage.
Augusta, Me., W. J. Skehan.
New Haven, Conn., Geo. B. Wuestefeld Co.
Sanford, Me., York County Garage.
Lynn, Mass., C. E. Whitten, 40 Central Ave.



Tourists' Service

THOUSANDS of motorists touring New England take advantage of the wonderful chain of Service Stations maintained by us. These Service Stations are the most complete in existence and in charge of real experts. This organization makes it possible to supply any demand at any time from any locality. Supply houses and garages can order from any station.

ELECTRICAL AND SPECIAL EQUIPMENT FOR MOTOR CARS AND MOTOR BOATS

Bosch Ignition for any Car, Boat or Stationary Engine.
 Special attachments and Bosch Ignition for battery equipped cars.
 Bosch Spark Plugs and Spare Parts.
 Bosch Rushmore Starting and Lighting Systems.
 Rushmore and Solar Lamps.

Armored and other Lighting and Ignition Cable.
 Mosler Split Fire Spark Plugs.
 Zenith Carburetors.
 Kemco Fan Type Generators and two-unit Universal Starting and Lighting Systems.
 Leak-Proof Piston Rings.

SPECIAL EQUIPMENT FOR FORD CARS

Bosch Ford Attachment

Nu 4 High-Tension Magneto Gear Driven Unit. Makes the Ford Car a Master Car.

Kemco 2-Unit Ford Starting and Lighting System

Fan Type Generator and Starting Motor in Front. Direct in Line with Crankshaft. Absolutely Dependable.

Our facilities for installation of Ignition, Starting and Lighting Systems, the repair of Magnetos and Generators are the very best.

Our forces are thoroughly trained. They know their business.

Correspondence Solicited.

Westinghouse Ford Starting and Lighting System

12 Vt. Single Unit, Single Wire, Driven by Enclosed Morse Silent Chain, Assures the Comfort and Security of Highest Priced Cars.

Zenith Ford Carburetor

Model 04 with Special Manifold, Hot Air and Gasoline Connections. More Power Economy, Greater Flexibility.

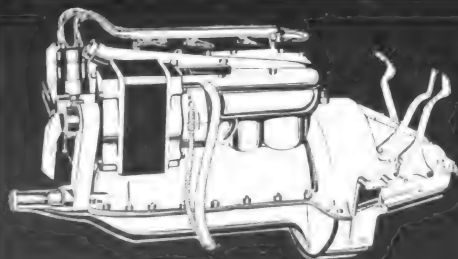
MOTOR PARTS COMPANY

BOSTON
187 Columbia Ave.

SPRINGFIELD
143 Chestnut St.

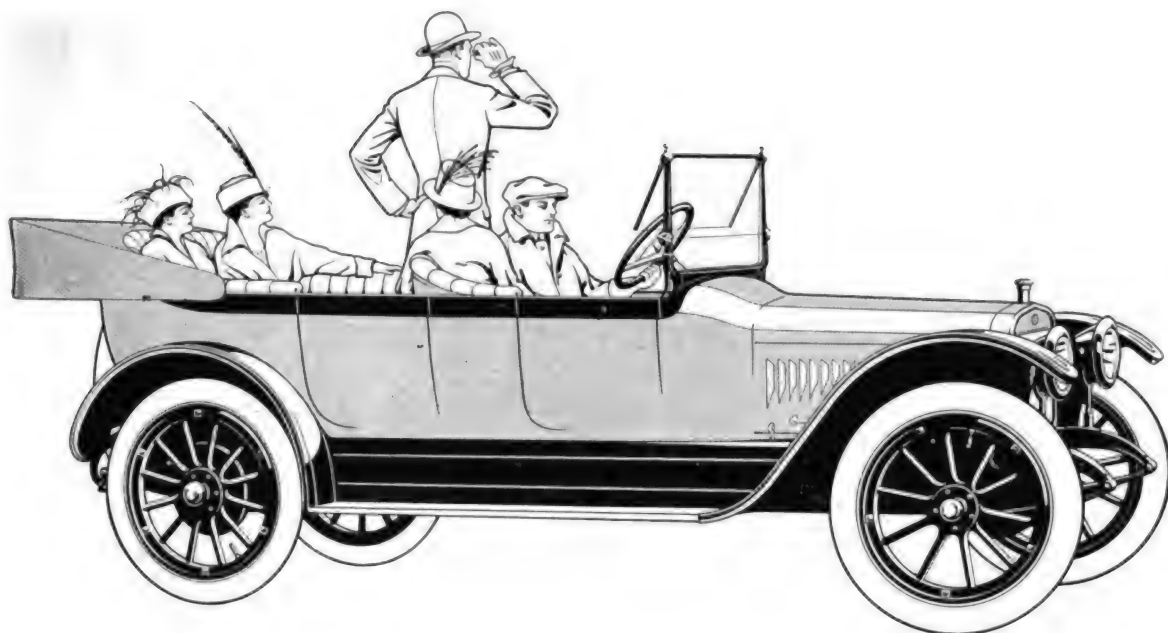
PHILADELPHIA
818 North Broad St.

BUFFALO
1064 Main St.



Westinghouse
Starting & Lighting
For **FORDS**

WINTON SIX



Something Finer and Different

THE \$2285 New-Size Winton Six is so much nicer than any other less-than-\$3000 car that there is simply no comparison. Made for men and women who want something finer—and different. Its wholesome unity, individuality, and restfulness please owners who are particular about their cars. Has probably the finest motor ever created. Classiest of equipment. Highest grade in every detail. And we finish your personal car in colors of your own selection, without extra charge.

Catalog now ready

The Winton Company

131 Berea Road,

Cleveland, Ohio

Index to Tours—Pages 20, 22, 24, 26, 30, 32.

TOURING with "No. 14 Set"

IS TO ASSURE YOURSELF AT THE START THAT YOU ARE

—Prepared for Anything—\$12.00 is reasonable for this assurance, isn't it?



MOSSBERG Socket Wrench Set No. 14

Ask for Catalog No. 171 E.

Sent prepaid on receipt of price if
your dealer cannot supply you.

\$12.00

FRANK MOSSBERG CO., - - - Attleboro, Mass.

Index to Tours—Pages 20, 22, 24, 26, 30, 32.



A New Car

in the

\$1000 Class

Watch for it!

See it before buying!

The Willys-Overland Company

Toledo

Ohio

THE EASIEST-RIDING CAR IN THE WORLD

A New Series Marmon "Forty-One"



Superlative of Body Refinement

THE new series Marmon "Forty-One" is chiefly remarkable because of an extraordinary development in body design and construction. The finest of automobile chassis is now fitted with bodies which, like the mechanism, leave nothing to be desired. The beautiful sheet aluminum touring car bodies are lighter in

weight—stronger, roomier and better in finish and details—giving greater comfort and more pleasing lines. The greatest forward step in the upholsterer's art is shown in the new straight pipe upholstery, which gives a new and added luxury to these distinctive new designs.

The new series Marmon "Forty-One" is furnished in Five and Seven-Passenger Touring Cars—the "Club" Three-Passenger Roadster and Two-Passenger Speedster Bodies—the most beautiful and distinctive bodies America has ever produced.

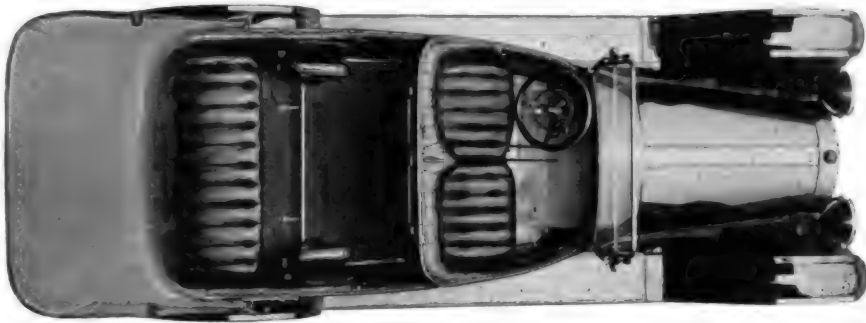
Nordyke & Marmon Company

Indianapolis (*Established 1851*) Indiana

OVER SIXTY YEARS OF SUCCESSFUL MANUFACTURING

THE EASIEST-RIDING CAR IN THE WORLD

A New Series Marmon "Forty-One"



No Change in Chassis

THERE is not a material change in the chassis of the new series Marmon "Forty-One."

The proven six-cylinder Marmon engine—the famous Marmon oiling system with the specially designed enclosed cam shaft—the wonderful Marmon clutch—spiral bevel drive—Bosch electrical system—and many other details, combine to make the "41" chassis the highest example of

mechanical excellence. We could not improve them.

The result is a car that excels in acceleration—hill climbing—speed—endurance—every point convincingly proven by the actual performance of stock cars during the past season.

The price is unchanged.

The value is backed by our standing offer—"Make us prove it!"

Dealers who appreciate that real value, not attractive promises, sells automobiles—who know the profits of dealing with the big man of the community—will get the details of this Marmon proposition. How about proving it to you?

Nordyke & Marmon Company

Indianapolis (*Established 1851*) Indiana

OVER SIXTY YEARS OF SUCCESSFUL MANUFACTURING

Study This Illustration And See Why Oil **MUST** Run Off; Soot **CAN'T** Form

at the sparking point of this plug. Notice the form of the electrodes—any oil splashed against them must run down, and away from the sparking point, just as rain runs away from the ridge-pole of a house. This is only one of many unusual features that make



JUMBO SPARK PLUGS



the best buy in the spark plug market. The big, massive insulator will **not** crack with the heat. A liberally proportioned copper-asbestos washer prevents compression leakage, and protects the porcelain insulator from the hammer-like blows of explosion.

No matter what terminals are on the cables in the car. Jumbo Jiant will fit them, because it has a

Universal Terminal

which gives perfect electrical contact with plain, Q-D or slip terminals. This means that the dealer needs to carry in stock only a third as many plugs to meet all requirements.

When you put a set of Jumbo Jiants on your car, your plug troubles are taken care of for fifty-two weeks, for

Every Jumbo Jiant is Guaranteed For a Year

This means precisely what it says—if, at any time within one year of purchase,

Our discounts will interest you—write for them.

a Jumbo Jiant develops any defect, or in any way falls down on the job, you can get a new one without further cost. Just send the defective plug back to us, with the guarantee coupon issued at time of purchase, and we will see that you're supplied with a new plug.

Test Jumbo Jiant For Yourself

If you are a dealer, write us on your own letterhead, and we will send you a plug for trial. Test it out under the most severe conditions you can think of. If it doesn't fully prove its absolute superiority over every other plug made in America, we won't expect your future business.

GIBSON-HOLLISTER MFG. CO.

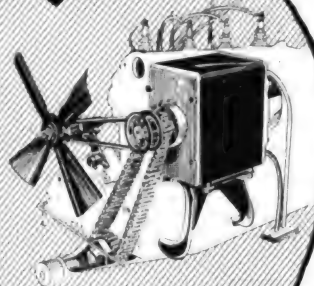
3380 WASHINGTON STREET

JAMAICA PLAIN, MASS.

69-6

SPLITDORF-APELCO

\$ **ELECTRIC**
STARTING AND LIGHTING
SYSTEM



EVERYTHING AN
 OWNER NEEDS
 FOR INSTALLATION

FOR
Ford Cars

Always has the "punch" to start the motor.
 Stalling in traffic loses its terrors.
 Electric lights *all the time* if wanted.
 Motor repairs can be made without disturbing SPLITDORF-APELCO installation.

Ideal for the women folk who drive.
 Simple and very easy to install.
 The *best* system for the *least* money.

Orders placed at once will be filled without delay.

Pacific Coast Price, \$73.00; Canadian Price, \$85.00, f. o. b. Toronto



SPLITDORF ELECTRICAL COMPANY

Atlanta.....10-12 E. Harris St.
 Boston.....1112 Boylston St.
 Chicago.....64-72 E. 14th St.
 Cincinnati.....811 Race St.
 Dallas.....402 S. Ervay St.
 LONDON

Detroit.....972 Woodward Ave.
 Kansas City...1827 Grand Ave.
 Los Angeles...1215 S. Hope St.
 Minneapolis...34 S. 8th St.
 Newark.....290 Halsey St.
 New York.....3-5-7 W. 61st St.

Pittsburgh...5941 Ellsworth Ave.
 Philadelphia...210-212 N. 13th St.
 San Francisco...1028 Geary St.
 Seattle.....1628 Broadway
 Toronto.....409 Yonge St.
 BUENOS AIRES

FACTORIES: NEWARK, N. J.

Ford Special High Tension Magnetos, Dual Ignition Systems, Coils, Plugs, Cable

Index to Tours—Pages 20, 22, 24, 26, 30, 32.

COE'S WRENCHES



UNEQUALLED FOR QUALITY THE WORLD OVER

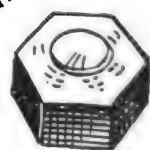
The wrench is the most used and the most useful tool in a motorist's kit.

COE'S Special Automobile Model is a perfect tool. The jaws are hardened special quality tool steel to withstand hard usage, and the handle is long to afford great leverage. The wrench is thin to work in space inaccessible for ordinary wrenches.

Coe's Special Automobile Model wrench is a tool kit in itself. Coe's quality costs slightly more, and it is worth many times the price of any other tool. A Coe's is always dependable, in the garage or on the road. Literature sent at request.

COE'S WRENCH COMPANY WORCESTER, MASS.

Distributors: { J. C. McCarty & Co., 21 Murray Street,
John H. Graham & Co., 113 Chambers Street, } New York City



Index to Tours—Pages 20, 22, 24, 26, 30, 32.



TUCK THIS UNDER YOUR HOOD

POLARINE in your crank-case means a better running car on the road and less time spent in the repair shop.

Polarine

The Standard Oil for All Motors

Friction costs more than oil. You pay one price for POLARINE but you pay for friction many times over—in lost power, repairs, depreciation.

POLARINE lubricates efficiently under all conditions. It "stands up" in the hottest cylinder.

For sale wherever you see the SOCONY sign—the sign of quality gasoline and quality lubricants

HOW MANY CARS CAN YOU NAME?

Each radiator represents a well known car.
How many can you identify?

STANDARD OIL COMPANY OF NEW YORK

Principal Stations:

New York

Buffalo



Albany

Boston



Inter - State
\$1000 in 1915

Now
\$850
1916

Same Car New Price

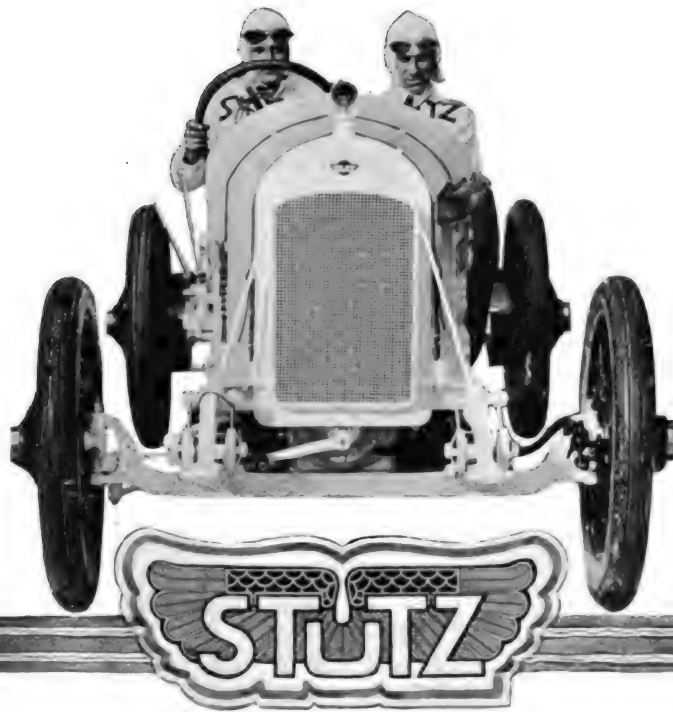
Powerful Valve-in-Head Motor.
Big, Full Five-Passenger Body.

Energetic Dealers in open territory, who wish to meet the keenest competition at a good margin of profit, will write or wire today for our new Selling Agreement.

The 1915 *Inter-State* at \$1000 created a demand which will allow us for 1916 to offer the *same* car at \$850.

INTER-STATE MOTOR CO.
Muncie, Ind.

Index to Tours—Pages 20, 22, 24, 26, 30, 32.



Always the Leading American Car

This year's 500 mile Indianapolis Speedway race fixed for all time STUTZ' claim to *Power, Speed and Consistency*.

STUTZ was the first American car to finish this year as it was last.

The entire STUTZ team—three cars—finished 3rd, 4th and 7th. No other team, American or foreign, has ever accomplished that.

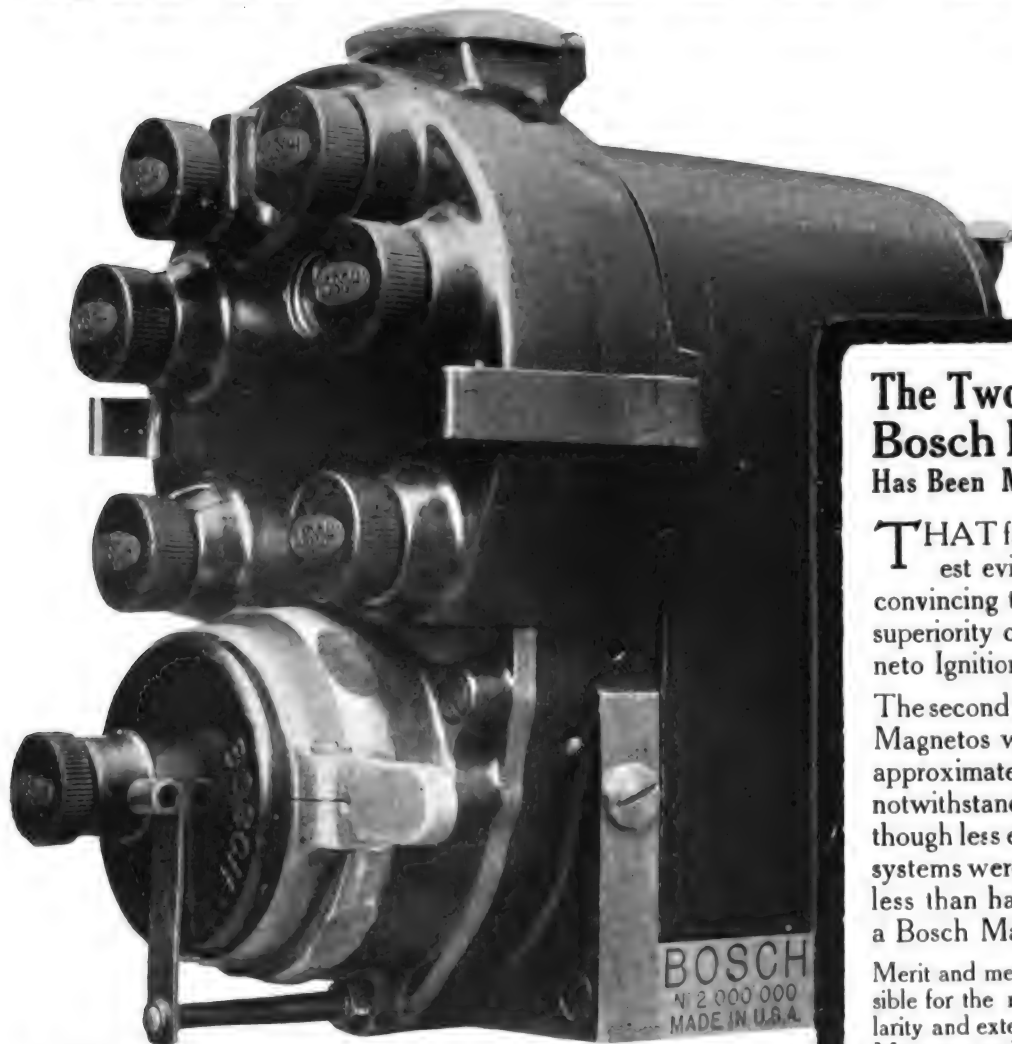
In four races, STUTZ cars have been placed seven times. No other make, American or foreign, approaches that record.

Anderson, in the first STUTZ, making seven tire changes to two for the foreign winner, averaged 87 miles per hour. Cooper's STUTZ averaged 86.62 and Wilcox's STUTZ 79.65.

STUTZ, always and everywhere, leads in *consistent* performance.

STUTZ MOTOR CAR COMPANY
Indianapolis, Ind.

2.000.000



The Two Millionth Bosch Magneto Has Been Made and Sold.

THAT fact is the strongest evidence, the most convincing testimony to the superiority of Bosch Magneto Ignition.

The second million of Bosch Magnetos was sold within approximately two years notwithstanding that other, though less efficient, ignition systems were procurable for less than half the price of a Bosch Magneto.

Merit and merit alone, is responsible for the remarkable popularity and extensive use of Bosch Magnetos. No other ignition system is just as good.

Look for Bosch on the car you buy or sell—insist if you must.

BE SATISFIED SPECIFY BOSCH.

BOSCH MAGNETOS

BOSCH MAGNETO CO., 204 WEST 46TH ST., NEW YORK, U. S. A.

Index to Tours—Pages 20, 22, 24, 26, 30, 32.



The Car Engineer Will Tell You

The best lubricant you can buy is the most economical, because it protects the car against wear, insures constant service and minimizes repair bills. The use you obtain from your car is dependent upon the investment you make in good lubricant.

Dealers selling automobile oils can tell you that EAGLEINE No-Karbon Oil is a perfect lubricant when used in any vehicle and in any operating conditions. This knowledge is based on years of service experience.

EAGLEINE OILS will not carbonize. It is sold in sealed containers by all dealers who sell quality supplies and accessories. Satisfied customers in all sections of America are using EAGLEINE OILS, and copies of their letters will prove that these lubricants are unequalled for every use.

Wherever purchased, while at home or touring, EAGLEINE quality is always certain.

EAGLE OIL AND SUPPLY COMPANY
 104 Broad Street Boston, Mass.

The NEW ROYAL MASTER-MODEL 10

**"The Machine with a
Personality"
FEATURE No.2**

No Matter
What Your
Personality
May Be—
The ROYAL
MASTER-
MODEL 10
will fit it:



"Just
Turn
the
Knob"

EVERY keen-witted stenographer, every office manager, every expert operator on the firing-line of "BIG BUSINESS" will grasp at once the enormous work-saving value of the *New Royal Model 10*.

Because it is "the machine with a personality"—*your* personality! Think of a master machine with an adjustable touch—a typewriter you can "tune up" to fit your own *personal* touch, simply by "turning the knob" until it strikes the keynote of **YOURSELF**.

Think of getting through your week's work with the *minimum* of effort and banishing the dull grind of "typewriter nerves."

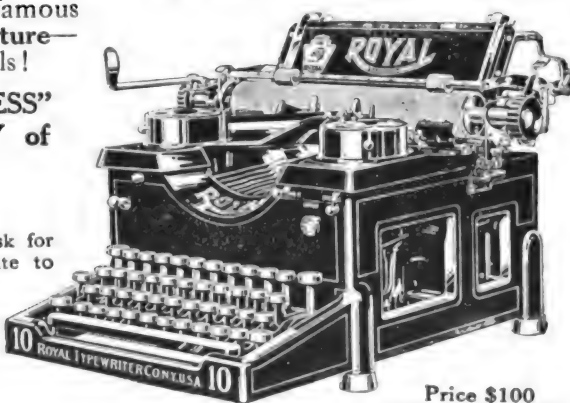
That's only *one* reason why the No. 10 Royal is the *master machine*. There are many other big, vital new features. Combined with the personality of its *regulated* touch, you get a typewriter with 100% speed—100% accuracy—100% visibility—100% durability—making 100% **EFFICIENCY**. A machine with 1,000 working-parts "*minus*"—a typewriter of *long-term service*, that need not be "traded out" and won't "die young."

The No. 10 Royal introduces many exclusive Royal features not found on any other typewriter in the world. It carries all standard improvements: **Tabulator, Back Space Key, Bichrome Ribbon and Automatic Reverse**, and has the famous **Royal Triple Service Feature**—it writes, types cards and bills!

**BUILT for "BIG BUSINESS"
and its GREAT ARMY of
EXPERT OPERATORS.**

Get the Facts!

Send for the "Royal man" and ask for a **DEMONSTRATION**. Or write to us direct for our new brochure, "Better Service," and a beautiful Color Photograph of the new Master-Model 10, showing *all* of its many remarkable new features. This advertisement describes only one. "Write now—right now!"



Price \$100
(\$125 in Canada)

ROYAL TYPEWRITER COMPANY, Inc.

Room 12, Royal Typewriter Building, Broadway, New York.

Branches and Agencies the World Over.

Index to Tours—Pages 20, 22, 24, 26, 30, 32.

\$1095**\$290 Lower
Than Ever.****NOW
THE
BIG
6****TWO SUPREME CAR VALUES**

When we announced these two supreme car values, motordom said "Too much car for the money—it can't be done". We didn't listen or argue—we *did it*. The result is two wonderful cars chock full of *built-in value*. Two Supreme

Herff-Brooks

Cars that dealers can make real money on—that virtually sell themselves. No sliding scale here—sell one, five or fifty and you get your profit. We have the car—the price—the proposition. Let's talk it over. Write for specifications or come to our factory and see how we make the car that will make you money.

Six-cylinder 4x4 1-2 motor, seven-bearing crank shaft, unit power plant, pressed steel frame, 120-inch wheel base, 34x4 tires (non-skid rear), completely equipped in every detail.

**AND HERE ARE THE BIG
4's VALUE SIGNS**

Four-cylinder 4x4 1-2 motor, five-bearing crank shaft, unit power plant, pressed steel frame, 110-inch wheel base, 33x4 tires (non-skid rear), completely equipped in every detail.

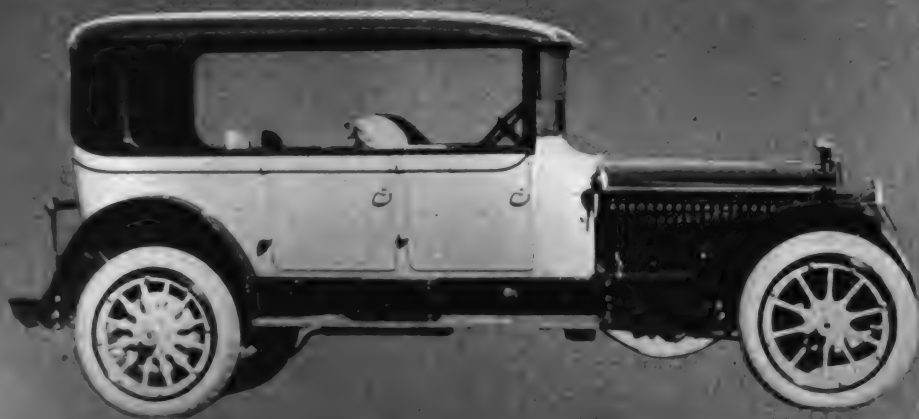
**HERE ARE THE BIG
6's SIGNS OF VALUE****\$215
Lower
Than
Ever****The
Big
4**

HERFF-BROOKS CORPORATION
Dept. D, Indianapolis, Indiana

**\$885
NOW**

Index to Tours—Pages 20, 22, 24, 26, 30, 32.

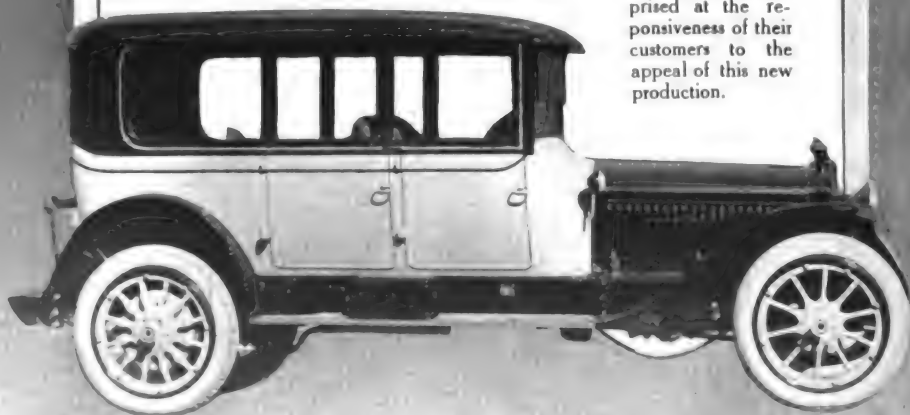
SPRINGFIELD CONVERTIBLE BODIES



THE limousine and the touring car are completely satisfactory only in certain seasons. The new Springfield Demi-Convertible body has no such limitations; it is the all-year, all purpose body.

More and more in America, as in Europe, the tendency is to demand protection from the sun, the dust and sudden showers even in touring. This body with its permanent top provides such protection, while it gives plenty of air and an unobstructed view. It may be converted into a limousine.

Dealers will be surprised at the responsiveness of their customers to the appeal of this new production.



SPRINGFIELD METAL BODY CO.

SPRINGFIELD, MASS.

READ! REFLECT! ACT!

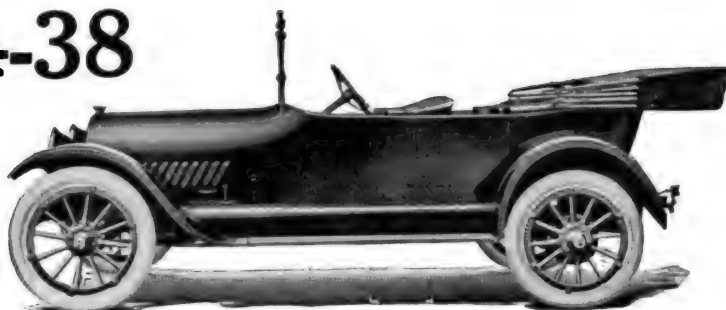
EVERY 1915 Auburn sold before the season was well started. That is the splendid tribute paid by a discriminating public. It is, therefore, with pardonable pride we announce the new Auburn 1916 beauties—far superior in artistic lines, rare beauty of finish, luxurious upholstery, and charming individuality, with an unusually roomy driver's seat, low center of gravity, ability to cling to the road, and wondrously easy-riding qualities.

Go over the Auburn with a critical eye, compare it with other cars in those points you know mark the real efficient car, check up the liberal specifications and note it is **completely** equipped. When you see the new Auburn you will be unable to realize how we can give you so much for so little, and that "so much" possesses all the merit and quality of which we are so justly proud. The initial demand for them has already passed our most sanguine expectations, and orders will only be accepted for as many cars as we can produce, consistent with Auburn ideals. So prompt action is essential.

Increased production permits a few additions to our dealers' organization. Will you be the lucky dealer who will get a line as permanent as it is profitable? Telephone, telegraph or write for our proposition.

Auburn 4-38

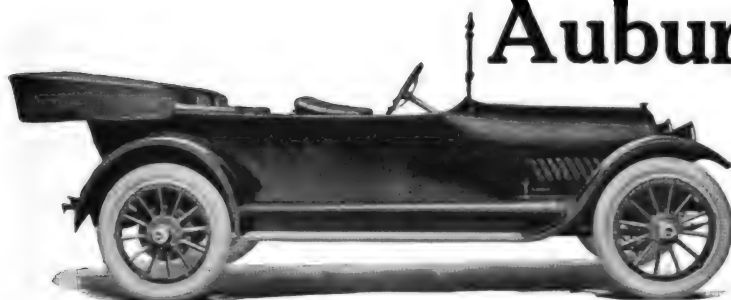
\$985



Specifications Model 4-38

Electric starter; electric lights; electric horn; center control; left-side drive; vacuum gasoline feed with tank in rear; access through all four doors; yacht-line body; spacious tonneau; roomy driver's compartment; instrument board in cowl dash; seats larger; upholstery deeper; one-man top; rain-vision, ventilating windshield; crowned fenders; cantilever springs; demountable rims; 34x4 tires; wheelbase, 114 inches; completely equipped; speedometer, tire irons, kit of tools, etc. Color, Royal Blue. Fenders, hood and flashings, black enamel. Two and five-passenger models.

Auburn Six-40-A



\$1550

Specifications Model 6-40-A

Electric starter; electric lights; electric horn; center control; left-side drive; vacuum gasoline feed with tank in rear; access through all four doors; yacht-like body; spacious tonneau; roomy driver's compartment; instrument board in cowl dash; seats larger; upholstery deeper; one-man top; rain-vision, ventilating windshield; crowned fenders; cantilever springs; demountable rims; 34x4 tires; wheelbase, 126 inches; completely equipped; speedometer, tire irons, kit of tools, etc. Color, Royal Blue. Fenders, hood and flashings, black enamel. Two and seven-passenger models.

AUBURN AUTOMOBILE COMPANY, Auburn, Indiana, U. S. A.

DISTRIBUTORS:

F. W. WRIGHT, Inc., 250 West 54th Street, New York City
MASSACHUSETTS MOTOR SALES CO., 157 Massachusetts Ave., Boston, Mass.

NEW YORK

CHICAGO

BOSTON

DETROIT.

Subscriptions:

The United States and Mexico,
\$1.50 a year; Canada and For-
eign Countries in Postal
Union, \$2.00 a year.
Ten cents a copy.

THE AUTOMOBILE JOURNAL

Remittances:

Should be made by Check, Draft,
Postoffice or Express Money
Order, or Registered Letter.
Money enclosures must
be at sender's risk.

William H. Black, Treasurer.

AUTOMOBILE JOURNAL PUB. CO.

Publi. hed the 10th and
25th of Each Month.

D. O. Black, Jr., Secretary.

Times Building, Pawtucket, R. I.

Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under Act of Congress of March 3, 1879.

VOL. XXXIX.

JULY 10, 1915.

NO. 11.

PUBLISHER'S AND READERS' PAGE.

THE Ninth Annual Touring Number of The Automobile Journal is the most comprehensive and complete routing guide, log and reference book ever published in this country. It is national in scope and covers exhaustively every state in the Union. The tourist, by referring to the routes, which are indexed and cross-indexed, on pages 20, 22, 24, 26, 30 and 32, can make up any number of combinations of tours and inform himself accurately about any trip he may choose to make in any section.

We Are Indebted to the following named associations for their valuable assistance, data and many of the magnificent illustrations presented: The National Highway Association, the Sante Fe railroad, Motor Club of South Carolina, the Touring Information Bureau of America, the Spokane Chamber of Commerce, the Massachusetts Highway Commission, the Dixie

Highway Association, Lincoln Highway Association, the Pikes Peak Ocean to Ocean Highway Association, Hoosier Motor Club of Indianapolis, the Great Northern railroad, the Colorado Highway Commission and many individuals.

Special Attention of the readers is called to the fact that The Automobile Journal has completed arrangements with several of the leading national touring bureaus of the country by which absolutely dependable touring data can be obtained without delay and free of cost to the regular subscribers of this magazine. This service, used in conjunction with The Ninth Annual Touring Number, will supply the reader with all the data necessary to make any tour in any part of the United States. Subscribers are urged to take advantage of this rare opportunity and to address their letters to the Touring Department Editor.

Index to Advertisers.

	Page
Ahlberg Bearing Co.....	152
Auburn Auto Co.....	17
Barrett Manufacturing Co.....	147
Bosch Magneto Co.....	12
Boyd, F. Shirley.....	148
Coes Wrench Co.....	8
Continental Asbestos Corp.....	148
Culver Stearns Mfg. Co.....	145
Detroit & Cleveland Nav. Co.....	152
Dixon Crucible Co., Jos.....	154
Dover Stamping & Mfg. Co.....	159
Eagle Oil & Supply Co.....	13
Elsemann Magneto Co.....	159
Fisk Rubber Co.....	25
Garford Mfg. Co.....	154
Gibson-Hollister Co.....	6
Goodyear Tire & Rubber Co.....	19
Gulf Refining Co.....	23
Harris Oil Co., A. W.....	28
Hartford Suspension Co.....	21
Heinze Electric Co.....	158
Herft-Brooks Corp.....	15
Hotel Lenox.....	153
Hotel Longacre.....	148
Hotel New Amsterdam.....	159
Hotel Majestic.....	154
Hotel Tuller.....	150
Houk Mfg. Co.....	27
Indian Refining Co.....	156
Inter-State Motor Co.....	10
Johnson, S. C. & Son.....	Cover
King Motor Car Co.....	31
Lenox Hotel.....	153
Longacre Hotel.....	148

	Page
Majestic Hotel.....	154
Marburg Bros.....	152
McQuay-Norris Mfg. Co.....	157
Mea Magneto Co.....	152
Mecca Mfg. & Spec. Co.....	18
Metz Company.....	159
Milwaukee Auto Spec. Co.....	158
Mossberg Co., Frank.....	2
Motor Parts Co.....	Cover
New Amsterdam Hotel.....	150
New Departure Mfg. Co.....	158
Nordyke & Marmon.....	4-5
N. Y. & N. J. Lubricant Co.....	156
O-Zel-O Co., The.....	156
Peerless Motor Car Co.....	148
Pyrene Co. of N. E.....	29
Reflex Ignition Co.....	150
Rome Turney Radiator Co.....	151
Royal Typewriter Co.....	14
Scripps-Booth Co., The.....	149
Spiltdorf Electrical Co.....	7
Springfield Metal Body Co.....	16
Standard Oil Co.....	9
Staybestos Mfg. Co., The.....	155
Stevens & Co.....	154
Studebaker Corp. of America.....	Insert
Stutz Motor Car Co.....	11
Superior Mfg. Co.....	148
Texas Co.....	158
Thermold Rubber Co.....	158
Times Square Automobile Co.....	18
Tuller Hotel.....	150
Vacuum Oil Co.....	Cover
Valvoline Oil Co.....	152
Vanderpool Company, The.....	18

	Page
Weed Chain Tire Grip Co.....	154
Willys-Overland Co.....	3
Winton Motor Co.....	1
Zenith Carb. Co.....	Cover

FOR SALE.
Shop Vulcanizer, Bargain.
Vanderpool, Springfield, O.

TIMES SQUARE AUTO CO.

WORLD'S LARGEST DEALERS

In Automobiles, Accessories and Supplies.
Selling Prices Lowest in the World. Send
for our Latest Price Wrecker and Save
Money.

TIMES SQUARE AUTO CO.

S. W. Cor. 56th St., 8'way | 1210 Michigan Ave
NEW YORK CHICAGO

**DEALERS, GARAGE MEN and
AUTOMOBILE AGENTS—**
To make money nowadays you
must buy cheap. We sell supplies
cheaper than any concern in the world.
Send for our latest bargain bulletin.

MECCA MFG. & SPECIALTY CO.
1743 Broadway | 1208 Michigan Ave.
NEW YORK CHICAGO

THE
11-YEAR
TYPE

GOOD YEAR
AKRON, OHIO
CORD TIRES

5
EXTRA
VIRTUES

CORD TIRE EVOLUTION

From the first-type Cord Tire to the Goodyear is a very long advance. It has taken us 11 years to complete it. But the result is now a vast Cord Tire revival—a fast multiplying vogue. You can now secure all the Cord Tire's virtues, without its faults, by demanding these Goodyear betterments.

Long Obscurity

Cord Tires were invented many years ago. At one time, through their super-comfort, they attained vast popularity. Then they dropped for some years into semi-obscurity. That was the original type.

That relapse was due mainly to high cost per mile. The first-type Cord Tire gave about as much comfort, power-saving and resiliency as the Goodyear Cord Tire of today. But cost-per-mile confined that type largely to electric cars, where comfort and power-saving made them essential.

Fighting the Fault

The Goodyear Cord Tire is now 11 years old. For some years we also built them mainly for Electrics. Then we found ways to vast extra mileage, offsetting their extra cost. Now gasoline car owners by the thousands are adopting the Goodyear Cord Tire. Leading car makers, including Packard, Franklin and Locomobile, make them regular standard equipment. Most makers of high-priced cars now supply them as extras. In six months the demand has multiplied at least 25 times over.

Long-Life Extras

These are our chief improvements:

Goodyear Cord Tires now have from 6 to 10 cord layers. Our 4-inch Cord Tire is 8-ply; our larger sizes are 10-ply. That means extreme reinforcement. They are vastly oversize. We

All-Weather
Tread



Ribbed
Tread

increased the air capacity by 30 per cent, which, by accepted formula, adds 75 per cent to the life.

We gave them our No-Rim-Cut feature, which combats a major waste. For extra security we vulcanized 126 braided piano wires into each tire base. To prevent skidding, we offered the All-Weather tread, tough and double-thick, with resistless grips. Also, we retained the Ribbed tread, always so popular with foreign makers. All these things were added—all exclusive to Goodyears—without sacrificing one iota of the virtues of Cord Tires.

This Type Will Stay

Don't judge the Goodyear Cord Tire by what you know of others, past or present. This new-type Cord will stay. It has that wondrous comfort which won men to old types. It has all their shock-absorbing qualities, all of their power saving—every iota. And we've ended the first-type faults.

Cord Tires are essential on pneumatic-tired Electrics. They add 25 to 30 per cent to the mileage per charge. On any car, gasoline or electric, they mean amazing comfort. But get the Goodyear Cord Tire, for you want long endurance, too. Goodyear costs no more than others.

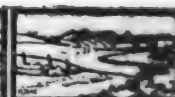
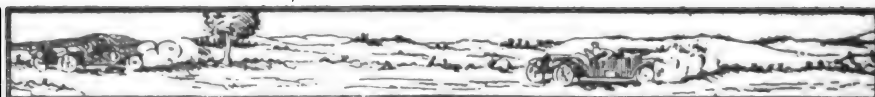
Most makers of cars, gasoline or electric, will supply them on request. Any Goodyear dealer can get them. Any Goodyear branch—in 65 cities—will direct you to a stock.

THE GOODYEAR
TIRE & RUBBER
COMPANY
Akron, Ohio

Directory of Touring Information

THE following index makes it possible to locate at once the routes leading to and from the principal vacation places, larger cities, and night stops covered by the routes given in this book:

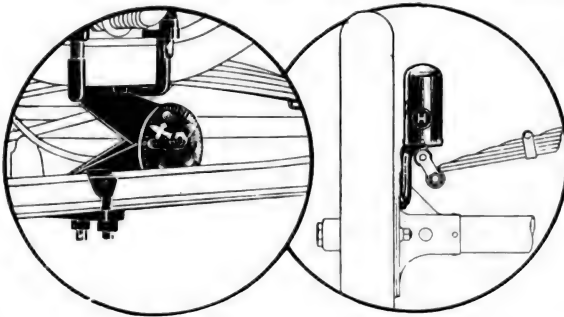
	Tour	Page	Map		Tour	Page	Map
Abilene, Tex.....	202	32	10-11	Butte, Mont.....	3	25	10-11
Akron, O.....	154	89	89	Calais, Me.....	16	52	51
Albuquerque, N. M..	2	19	10-11	Canton, O.....	1	6	10-11
Albuquerque, N. M..	207	94	95	Canton, O.....	154	90	89
Albany, N. Y.....	52	67	67	Cape May, N. J.....	62	79	79
Albany, N. Y.....	55	72	72	Cedar Rapids, Ia....	1	7	10-11
Alpine, Tex.....	202	32	10-11	Chatham, N. B.....	16	52	51
Amboy, Ariz.....	2	20	10-11	Chattanooga, Tenn..	102	82	82
Amsterdam, N. Y....	52	67	67	Charlemont, Mass....	17	56	58
Arlington, Mass.....	17	56	58	Cheyenne, Wyo.....	1	8	10-11
Arrow Rock, Mo.....	2	19	10-11	Chicago, Ill.....	1	6	10-11
Asbury Park, N. J....	62	79	79	Chicago, Ill.....	3	24	10-11
Ashley Falls, Mass....	17	56	58	Chicago, Ill.....	102	81	82
Ashtabula, O.....	155	90	91	Chicago, Ill.....	155	91	91
Atlanta, Ga.....	102	82	82	Cincinnati, O.....	152	88	89
Atlanta, Ga.....	108	85	82	Cincinnati, O.....	154	90	89
Atlanta, Ga.....	107	84	82	Claremont, N. H.....	18	58	58
Atlantic City, N. J....	62	79	79	Cle Elum, Wash.....	3	25	10-11
Athens, Penn.....	60	78	77	Cleveland, O.....	154	89	89
Auburn, N. Y.....	53	60	67	Cleveland, O.....	155	90	91
Augusta, Me.....	35	61	61	Coeur D'Alene, Ida..	3	25	10-11
Austin, Nev.....	1	8	10-11	Columbus, O.....	154	90	89
				Columbus, O.....	2	18	10-11
Babylon, L. I.....	56	74	74	Columbia, S. C.....	109	86	82
Baltimore, Md.....	2	18	10-11	Colby, Neb.....	201	30	30
Bangor, Me.....	16	52	51	Colorado Springs.....	201	30	30
Baraboo, Wis.....	3	25	10-11	Colorado Springs.....	207	94	95
Bar Harbor, Me.....	16	52	51	Colton, Utah.....	201	30	30
Barre, Vt.....	18	59	58	Concord, N. H.....	18	58	58
Batavia, N. Y.....	52	67	67	Concord, N. H.....	16	53	51
Bath, N. Y.....	60	78	77	Cooperstown, N. Y....	55	72	72
Battle Creek, Mich..	155	91	91	Cortland, N. Y.....	55	72	72
Beauneville, Que.....	19	61	61	Council Bluffs, Ia....	1	7	10-11
Bedford, Penn.....	1	6	10-11	Cumberland, Md.....	2	18	10-11
Belfast, Me.....	16	53	51				
Bellows Falls, Vt....	18	58	58	Dallas, Tex.....	202	32	10-11
Belleville, Ont.....	52	67	67	Dayton, O.....	2	18	10-11
Bellport, L. I.....	56	74	74	Dayton, O.....	152	88	89
Big Springs, Tex.....	202	32	10-11	Daytona, Fla.....	102	83	82
Billings, Mont.....	3	25	10-11	Davenport, Wash.....	3	25	10-11
Binghamton, N. Y....	53	67	69	Defiance, O.....	154	90	89
Binghamton, N. Y....	55	72	72	Delaware Water Gap,			
Bismarck, N. D.....	3	25	10-11	Penn.....	55	72	72
Bloomington, Ill.....	153	89	89	Deming, Tex.....	202	32	10-11
Bloomington, Ind.....	154	89	89	Denver, Col.....	1	8	10-11
Blue Point, L. I.....	56	74	74	Detroit, Mich.....	152	88	89
Boonville, Mo.....	2	19	10-11	Detroit, Mich.....	155	91	91
Bowling Green, O.....	152	88	89	Dickinson, N. D.....	3	25	10-11
Boston, Mass.....	15	41	41	Dixville Notch, N. H..	16	52	51
Boston, Mass.....	17	56	58	Dodge City, Kan.....	2	19	10-11
Boston, Mass.....	18	59	58	Dover, N. H.....	16	53	51
Bozeman, Mont.....	3	25	10-11				
Brattleboro, Vt.....	18	58	58	Eastport, L. I.....	56	74	74
Bretton Woods, N. H..	16	52	51	Emingham, Ill.....	2	19	10-11
Bretton Woods, N. H..	15	41	41	El Centro, Cal.....	202	32	10-11
Bridgeport, Conn.....	15	40	41	Elizabeth, N. J.....	62	79	79
Bristol, N. H.....	18	59	58	Elizabethtown, N. Y..	19	61	61
Brunswick, Me.....	16	53	51	Elmira, N. Y.....	60	78	77
Buena Vista, Col.....	201	30	30	El Paso, Tex.....	202	32	10-11
Buffalo, N. Y.....	52	67	67	Ely, Nev.....	1	8	10-11
Buffalo, N. Y.....	60	78	77	Emporia, Kan.....	206	92	92
Buffalo, N. Y.....	155	90	91	Enid, Okla.....	206	93	92
Burlington, Vt.....	16	51	51	Eric, Penn.....	155	90	91
Butler, Penn.....	60	78	77	Fall River, Mass.....	16	53	51
				Fargo, N. D.....	3	25	10-11
				Fergus Falls, Minn...	3	25	10-11
				Flagstaff, Ariz.....	2	20	10-11
				Forest City, Ark.....	202	31	10-11
				Fort Stockton, Tex.....	202	32	10-11
				Fort Wayne, Ind.....	1	6	10-11
				Fort Wingate, N. M....	2	19	10-11
				Fort Worth, Tex.....	202	32	10-11
				Fort Worth, Tex.....	206	93	92
				Fredrickton, N. B....	16	52	51
				Freeport, L. I.....	56	74	74
				French Lick, Ind.....	154	90	89
				Fulton, Mo.....	2	19	10-11
				Galveston, Tex.....	206	93	92
				Geneva, N. Y.....	53	69	67
				Gettysburg, Penn.....	1	6	10-11
				Globe, Ariz.....	207	94	95
				Grand Forks, N. D....	206	92	92
				Grand Island, Neb....	1	7	10-11
				Great Barrington,			
				Mass.....	17	56	58
				Greenport, L. I.....	56	74	74
				Green River, Wyo....	1	8	10-11
				Greenville, Me.....	16	52	51
				Hackettstown, N. J....	55	72	72
				Hamilton, Ont.....	155	91	91
				Hamilton, Ont.....	52	67	67
				Hartford, Conn.....	17	56	58
				Harrisburg, Penn.....	60	77	77
				Holbrook, Ariz.....	2	19	10-11
				Holidaysburg, Penn..	60	77	77
				Holyoke, Mass.....	18	58	58
				Hot Springs, Ark.....	202	31	10-11
				Houlton, Me.....	16	53	51
				Houston, Tex.....	206	93	92
				Hudson, N. Y.....	16	51	51
				Huntington, N. Y....	58	74	74
				Indianapolis, Ind....	2	18	10-11
				Indianapolis, Ind.....	152	88	89
				Indianapolis, Ind.....	154	90	89
				Indianapolis, Ind.....	102	82	82
				Ithaca, N. Y.....	55	72	72
				Jackman, Me.....	19	61	61
				Jackson, Mich.....	155	91	91
				Jacksonville, Fla....	102	83	82
				Jamaica, L. I.....	56	74	74
				Jamestown, N. Y....	60	78	77
				Jersey City.....	62	79	79
				Joliet, Ill.....	153	89	89
				Jonesville, Mich.....	152	89	89
				Kansas City, Mo....	2	19	10-11
				Kansas City, Mo.....	201	29	30
				Kearney, Neb.....	1	7	10-11
				Kearney's Ranch,			
				Utah.....	1	8	10-11
				Kingman, Ariz.....	2	20	10-11
				Kingston, Ont.....	52	67	67
				La Crosse, Wis.....	3	25	10-11
				Lafayette, Ind.....	102	81	82
				Laguna, N. M.....	2	19	10-11
				La Junta, Col.....	2	19	10-11
				Lake Sunapee, N. H..	15	40	41
				Lake George, N. Y....	19	61	61
				Lake George, N. Y....	55	72	72
				Lakewood, N. J.....	62	79	79
				La Porte, Ind.....	155	91	91
				Laramie, Wyo.....	1	8	10-11
				Las Animas, Col.....	2	19	10-11
				Las Vegas, N. M.....	2	19	10-11
				Las Vegas, N. M.....	207	94	95
				Lawton, Okla.....	206	93	92
				Leamington, Ont.....	155	91	91
				Lebanon, Penn.....	60	77	77
				Lenox, Mass.....	17	56	58



STANDARD *Hartford* EQUIPMENT } FOR *Ford* CARS

A PERFECT FORD SHOCK ABSORPTION EQUIPMENT

The Hartford Comfort Combination for Ford Cars—



ON FRONT

ON REAR

★ *Hartford* On the front of a Ford
SHOCK ABSORBER

On the rear of a Ford *Hartford*
CUSHION SPRING

The weight of the engine at the front of a Ford contributes to excessive spring action, here, when the road is rough. The Hartford Shock Absorber modifies or softens this action and eases the front of the Ford comfortably over bumps and ruts.

With less weight at the rear, the springs of a Ford inclined to ride stiff and hard at this point, are given the needed resiliency to carry their load buoyantly and gently.

Price One Hartford Shock Absorber Fittings Complete \$12
Two Hartford Cushion Springs

FORD "GAS" BILLS CLIPPED ONE-THIRD

Those who are using the **Hartford Economizer** on their Ford cars say that it is the most important Ford accessory produced in a decade. How true this is you will appreciate when you realize that it actually effects a saving of 33 per cent. in gasoline. More, it gives added power to a Ford engine and makes it run smoother. Feeds engine more air and less gas. Produces the ideal mixture for a Ford engine. Figure a third off gasoline bills and the Hartford Economizer looms as a mighty attractive buy at

Price, complete, \$6

INSURANCE
THAT PROTECTS
WHEN A



HARTFORD BUMPER

HARTFORD BUMPER is attached to a Ford car it improves its looks very perceptibly. Gives the effect of a longer frame, of longer lines. When collision comes, no harm can come with it to lamps, mudguards or radiator. Two spring-steel, frictionally-absorbing arms rub every blow of the power to hurt foreparts of car and car itself. Bolts on without drilling. Price, complete, \$10

Ask us to send you interesting data on Standard Hartford Equipment for Ford Cars.

HARTFORD SUSPENSION CO., E. V. HARTFORD, 147 Morgan St., Jersey City, N. J.
President

Makers of the Hartford Cushion Spring, Hartford Electric Brake, Hartford Auto Jack, Hartford Bumper.

BRANCHES: Boston, 319-325 Columbus Avenue; Chicago, 2637 Michigan Avenue; New York, 1846 Broadway and 212-214 West 88th Street; Newark, N. J., 273 Halsey street; Indianapolis, 425 North Capitol Boulevard. DISTRIBUTORS: Auto Accessory & Speedometer Co., Denver, Col.; Chanslor & Lyon Co., San Francisco, Los Angeles, Oakland, Fresno, Portland, Seattle; L. Mastrangel & Co., 117 South Beatty Street, Pittsburgh, Pa.; Pennsylvania Rubber & Supply Co., Cleveland, O.; Hartford Agency, 1437 Vine Street, Philadelphia, Pa.; Reinhard Bros. Co., Inc., Minneapolis, Minn.; Hartford Agency, 1803 Grand Avenue, Kansas City, Mo.; Charles Rubel & Co., 1312 Fourteenth Street, N. W., Washington, D. C.

*Formerly Truffault-Hartford.

Directory of Touring Information

Tour Page Map			Tour Page Map			Tour Page Map		
Lenox, Mass.....	15	40 41	North Platte, Neb....	1	7 10-11	Salt Lake City, Utah	201	30 30
Lexington, Ky.....	17	56 58	Norwalk, O.....	155	91 91	Salt Lake City, Utah	208	94 96
Lima, O.....	1	6 10-11	North Yakima, Wash.	208	95 96	Salt Lake, N. M.....	207	94 95
Lincoln, Ill.....	153	89 89	Oklahoma City.....	206	93 92	San Bernadino, Cal..	2	20 10-11
Little Rock.....	202	31 10-11	Omaha, Neb.....	1	7 10-11	San Diego.....	202	32 10-11
Livingston, Mont....	3	25 10-11	Oneonta, N. Y.....	53	69 67	San Francisco.....	2	20 10-11
Logansport, Ind.....	152	89 89	Ortonville, S. D....	206	92 92	San Jose, Cal.....	2	20 10-11
Long Branch, N. J....	62	79 79	Ottawa, Can.....	52	66 67	San Louis Obispo....	2	20 10-11
Los Angeles, Cal....	2	20 10-11	Owego, N. Y.....	53	70 67	Santa Barbara.....	2	20 10-11
Louisville, Ky.....	102	82 82	Patchogue, L. I....	58	74 74	Santa Fe, N. M.....	2	19 10-11
Louisville, Ky.....	154	90 89	Pawtucket, R. I....	15	41 41	Santa Fe, N. M.....	207	84 95
Lowell, Mass.....	18	59 58	Peekskill, N. Y....	55	73 72	St. Augustine, Fla..	102	83 82
Lyons, Kan.....	2	19 10-11	Pembina, Man.....	208	92 92	St. Paul, Minn.....	3	25 10-11
Macon, Ga.....	102	82 82	Perth Amboy, N. J.	62	79 79	St. Cloud, Minn....	3	25 10-11
Madison, Wis.....	3	24 10-11	Philadelphia.....	1	5 10-11	St. John, N. B.....	16	52 51
Malad City, Ida.....	208	95 96	Philadelphia.....	2	17 10-11	St. Johnsbury, Vt..	18	59 58
Mammoth Cave, Ky..	102	82 82	Philadelphia.....	60	77 77	St. Joseph, Mich....	155	91 91
Manchester, Vt.....	15	40 41	Phoenix, Ariz.....	207	94 95	St. Mary's, Que.....	19	61 61
Manchester, Vt.....	16	51 51	Piqua, O.....	152	88 89	St. Louis, Mo.....	153	89 89
Manchester, N. H....	18	59 58	Pittsburg, Penn....	1	6 10-11	Saratoga, N. Y.....	55	72 72
Mansfield, O.....	1	6 10-11	Pittsburg, Penn....	60	77 77	Savannah, Ga.....	109	86 82
Marion, O.....	1	6 10-11	Pittsfield, Mass....	15	40 41	Sayville, L. I.....	56	74 74
Marshalltown, Ia....	1	7 10-11	Pittsfield, Mass....	16	51 51	Schenectady, N. Y..	55	72 72
Martinsville, Ind....	154	90 89	Pittsfield, Mass....	17	56 58	Schenectady.....	52	67 67
Mattawamkeag, Me..	16	53 51	Plattsburg, N. Y....	19	61 61	Seranton, Penn....	55	72 72
Mattituck, L. I.....	56	74 74	Plymouth, N. H....	15	40 41	Seligman, Ariz....	2	20 10-11
Meeker, Col.....	201	30 30	Pocatello, Ida.....	208	95 96	Seattle, Wash.....	20	95 96
Memphis, Tenn.....	202	31 10-11	Poland Springs, Me.	15	41 41	Seattle, Wash.....	20	95 96
Miami, Fla.....	102	83 82	Pontiac, Ill.....	153	89 89	Sharon Springs, N. Y.	55	72 72
Middlebury, Vt.....	16	51 51	Portland, Me.....	15	41 41	Shelfield, Penn....	60	78 77
Mifflintown, Penn..	60	77 77	Portland, Me.....	16	53 51	Shelbyville, Ky....	154	90 89
Milwaukee, Wis.....	3	24 10-11	Portland, Ore.....	209	96 96	Sierra Blanca.....	202	32 10-11
Miles City, Mont....	3	25 10-11	Port Hope, Ont....	52	67 67	Sioux City, Ia.....	206	92 92
Mincola, L. I.....	56	74 74	Portsmouth, N. H..	15	41 41	Sioux Falls, S. D..	206	92 92
Minneapolis, Minn..	3	25 10-11	Port Jefferson, L. I.	56	74 74	Sisson, Cal.....	209	96 96
Missoula, Mont.....	3	25 10-11	Poughkeepsie, N. Y.	16	51 51	Skowhegan, Me....	16	52 51
Moncton, N. B.....	16	52 51	Poughkeepsie, N. Y.	55	73 72	South Bend, Ind....	1	6 10-11
Moorhead, Minn....	3	25 10-11	Prescott, Can.....	52	67 67	South Bend, Ind....	152	89 89
Montpelier, Vt.....	18	59 58	Providence, R. I....	15	41 41	Spokane, Wash....	3	25 10-11
Montreal, Que.....	52	66 67	Providence, R. I....	17	56 58	Springfield, O.....	2	18 10-11
Morris, Ill.....	153	89 89	Provincetown, Mass.	16	53 51	Springfield, Mass..	16	54 51
Morrisburg, Que....	52	67 67	Pueblo, Col.....	207	94 95	Springfield, Ill....	153	89 89
Morristown, N. J....	55	72 72	Quebec, Can.....	19	61 61	Syracuse, Kan.....	2	19 10-11
Napoleon, O.....	154	90 89	Rahway, N. J.....	62	79 79	Syracuse, N. Y....	52	67 67
Narragansett Pier, R. I.....	15	41 41	Rangeley, Col.....	201	30 30	Tacoma, Wash.....	3	25 10-11
Nashville, Tenn.....	102	82 82	Rangely, Me.....	16	52 51	Tacoma, Wash.....	209	96 96
Needles, Cal.....	2	20 10-11	Raton, N. M.....	207	94 95	Taunton, Mass.....	16	53 51
New Bedford, Mass..	16	54 51	Reading, Penn.....	60	77 77	Terre Haute, Ind....	2	18 10-11
New Castle, N. H....	15	41 41	Red Cliff, Col.....	201	30 30	Terry, Mont.....	3	25 10-11
Newburyport, Mass..	15	41 41	Reno, Nev.....	1	8 10-11	Tepico, Kan.....	206	92 92
New Alexandria, Penn.....	60	77 77	Riddle, Ore.....	209	96 96	Toronto, Ont.....	52	67 67
Newark, N. J.....	62	79 79	Rifle, Col.....	201	30 30	Three Rivers, Que..	19	61 61
New Haven, Conn....	15	41 41	Riverhead, L. I....	56	74 74	Trenton, N. J.....	2	17 10-11
New London, Conn....	15	41 41	Rochester, N. Y....	52	67 67	Trinidad, Col.....	2	19 10-11
Newport, Vt.....	16	52 51	Roosevelt, Utah....	201	30 30	Trinidad, Col.....	207	94 95
Newport, R. I.....	16	53 51	Rutland, Vt.....	16	51 51	Tucson, Ariz.....	202	32 10-11
Newry, N. H.....	16	52 51	Sacramento, Cal....	1	9 10-11	Unadilla, N. Y.....	53	69 67
New York.....	1	5 10-11	Sacramento, Cal....	209	97 96	Uniontown, Penn....	2	18 10-11
New York.....	55	72 72	Sagamore, N. Y....	55	72 72	Valparaiso, Ind....	155	91 91
New York.....	16	51 51	Sag Harbor, L. I....	56	74 74	Vandalla, O.....	152	88 89
Niagara Falls.....	52	67 67	Salem, Ore.....	209	96 96	Waco, Tex.....	206	93 92
Niagara Falls.....	155	91 91	Sallman, Cal.....	2	20 10-11	Wading River, L. I.	56	74 74
North Adams, Mass..	17	56 58	Sallman, Kan.....	201	29 30	Walla Walla, Wash.	208	95 96
North Attleboro, Mass.....	15	41 41	Salt Lake City, Utah	1	8 10-11	Wapakonita, O.....	152	88 89
Northampton, Mass.	18	58 58				Washington, D. C..	2	18 10-11
						Washington Court House, O.....	154	90 89



There is MORE POWER in that
Good Gulf Gasoline

A Clean, Powerful Gasoline refined especially for the automobile trade

and

Supreme Auto Oil

The Perfect Lubricant

GULF REFINING COMPANY

General Sales Offices

**General Sales
Offices** **Pittsburgh, Pa.**

The Largest Independent Refining Company in the World

DISTRICT SALES OFFICES

New York

Philadelphia

Boston

Atlanta

Tampa

New Orleans

Houston

FREE ROAD MAPS may be obtained from any dealer displaying the orange disc sign---or mailed on request

Directory of Touring Information

	Tour	Page	Map
Waterbury, Conn.	16	54	51
Waterbury, Conn.	15	40	41
Waterville, Wash.	3	25	10-11
Watkins Glen, N. Y.	53	70	69
Waukegan, Kas.	201	29	30
Weatherford, Tex.	202	32	10-11
Welser, Ida.	208	95	96
Westfield, N. Y.	60	78	77
Westerly, R. I.	15	41	41
Wenatchee, Wash.	3	25	10-11
White River Jet.	18	58	58
Wichita, Kas.	206	92	92
Wichita Falls, Tex.	206	93	92
Wilcox, Ariz.	202	32	10-11
Williams, Ariz.	2	20	10-11
Williamsville, Conn.	17	56	58
Windsor, Ont.	155	91	91
Winnipeg, Man.	206	92	92
Winston Salem, N. C.	109	85	82
Wrentham, Mass.	15	41	41
Ypsilanti, Mich.	152	89	89
Ypsilanti, Mich.	155	91	91

KEY TO ROUTE INDEX.

AS EXPLAINED elsewhere, the itineraries listed in this book have been prepared with a view to connecting all sections of the country, so that it should be possible to start from any point and reach any other point. The several routings presented below indicate the manner in which the itineraries in this number may be utilized in planning additional tours. Obviously, it would prove impracticable to list more than a very small proportion of the possible tours which might be arranged in this manner, and it is assumed that with this guide the tourist will have no difficulty in making his own plans as he desires. However, The Automobile Journal is prepared to lend every assistance upon request.

It should be understood that routes marked "R" are to be followed in a REVERSE direction.

ATLANTA, GA.-NIAGARA FALLS, N. Y.

	Route	Page	Miles
Atlanta to Louisville	102R	82	491.9
Cleveland	154R	90	471.4
Niagara Falls	155R	90	277.2
Total Mileage			1240.5

ATLANTA, GA.-DETROIT, MICH.

	Route	Page	Miles
Atlanta to Louisville	102R	82	491.9
Toledo	154	90	325.3
Detroit	152R	88	58.4
Total Mileage			865.4

BALTIMORE, MD.-BRETTON WOODS, N. H.

	Route	Page	Miles
Baltimore to New York	2R	17	196.0
Bretton Woods	15	40	395.6
Total Mileage			581.6

BALTIMORE, MD.-DETROIT, MICH.

	Route	Page	Miles
Baltimore to Indianapolis, Ind.	2	17	517.2
Detroit, Mich.	152	88	326.3
Total Mileage			843.5

BOSTON, MASS.-SAN FRANCISCO, CAL.

	Route	Page	Miles
Boston to Pittsfield, Mass.	17	56	190.6
Hudson, N. Y.	16R	51	40.9
Albany, N. Y.	55R	72	33.1
Buffalo	52R	67	305.6
Chicago	155	90	580.0
San Francisco	1	7	2359.9
Total Mileage			3510.1

BOSTON, MASS.-ST. LOUIS, MO.

	Route	Page	Miles
Boston to New York	15	41	245.7
St. Louis	2	17	1053.6
Total Mileage			1299.3

BOSTON, MASS.-MONTREAL, QUE.

	Route	Page	Miles
Boston to Portland, Me.	15R	41	146.2
Montreal	35	61	459.9
Total Mileage			606.1

BUFFALO, N. Y.-JACKSONVILLE, FLA.

	Route	Page	Miles
Buffalo to Cleveland, O.	155	90	191.9
Louisville, Ky.	154	89	571.4
Jacksonville, Fla.	102	81	887.3
Total Mileage			1650.6

BUFFALO, N. Y.-ATLANTIC CITY, N. J.

	Route	Page	Miles
Buffalo to Albany	52	67	307.6
New York	55	72	149.3
Atlantic City	62	79	153.5
Total Mileage			610.4

BUFFALO, N. Y.-KANSAS CITY, MO.

	Route	Page	Miles
Buffalo to Cleveland	155	90	191.9

Zanesville	154	89	159.2
Kansas City	2	18	674.4

Total Mileage.....1025.5

BURLINGTON, VT.-BOSTON, MASS.

	Route	Page	Miles
Burlington to Bretton Woods	16	51	161.0
Boston	18	58	187.2

Total Mileage.....348.2

BURLINGTON, VT.-WASHINGTON, D. C.

	Route	Page	Miles
Burlington to New York	16R	51	325.7
Washington	2	17	235.0

Total Mileage.....560.7

CHATTANOOGA, TENN.-CLEVELAND, O.

	Route	Page	Miles
Chattanooga to Louisville	102R	82	365.4
Cleveland	154R	90	471.4

Total Mileage.....836.8

CHICAGO, ILL.-ATLANTIC CITY, N. J.

	Route	Page	Miles
Chicago to New York	1R	5	897.1
Atlantic City	62	79	153.5

Total Mileage.....812.1

CHICAGO, ILL.-BALTIMORE, MD.

	Route	Page	Miles
Chicago to Indianapolis	102	81	196.9
Baltimore	2R	17	615.2

Total Mileage.....812.1

CHICAGO-GALVESTON, TEX.

	Route	Page	Miles
Chicago to St. Louis	153	89	333.8
Kansas City	2	19	299.9
Topeka	201	29	78.5
Galveston	206	92	112.5

Total Mileage.....1824.7

CINCINNATI, O.-WINNIPEG, MAN.

	Route	Page	Miles
Cincinnati to South Bend	152	88	260.0
Chicago	1	6	101.1
Fargo	3	24	751.4
Winnipeg	206	92	254.0

Total Mileage.....1366.5





A Helping Hand For Every Motorist

This Is To Be Taken Literally And Interests Every Car Owner!

SO FAR as we can, through our Service System, we will eliminate for *any* car owner all inconveniences in the use of tires.

If you use tires other than Fisk, we particularly invite you to stop in at one of our Branches the next time your tires need attention and thereby inform yourself as to the *substantial* qualities of Fisk Service.

To present Fisk Users we would say that the privileges enjoyed at your local Fisk Branch are to be found in every city where we are located.

The Secret of the Success of the Fisk Service Policy is its uniformity. The Service is organized. There

FISK BRANCHES IN NEW ENGLAND

CONNECTICUT.

Bridgeport—284 Fairfield Ave., Between
Broad and Harrison Sts.
Hartford—292 Asylum St.

MASSACHUSETTS.

Boston—811-813 Boylston St.
Lowell—Central and Appleton Sts.
Lynn—135 Broad St., Near Newhall.
Springfield—141 Chestnut St., Opposite Hotel
Kimball.

Worcester—730 Main St.

RHODE ISLAND.

Providence—17 Dorrance St.

is nothing like it in the tire industry. We are building our business on an Established Reputation for Good

Tires and for Courtesy and a Personal Interest in the requirements of *all* tire users.

Every car owner, regardless of what tire he may use, is *welcome* in any Fisk Branch. He will find there a spirit of accommodation which will add materially to his pleasure and convenience when his tires are in need of attention of any kind.



Fisk Tires Are An Extraordinary Buy

Prices are Low. There never was a time when Fisk Tires were better quality or gave more universal satisfaction. This statement can be easily verified by inquiry among Fisk Tire users.

THE FISK RUBBER COMPANY

Factory and Home Office

Chicopee Falls, Mass.

You Can Buy Fisk Tires From ALL Dealers—Fisk Branches in ALL Principal Cities

Directory of Touring Information

CINCINNATI, O.-ST. JOHN, N. B.

Cincinnati to	Route	Page	Miles
Canton	154R	90	277.4
New York	1R	5	498.2
Portland, Me.	15R	41	391.9
Bangor	16R	53	140.8
St. John	16	52	234.5

Total Mileage.....1542.8

CINCINNATI, O.-TORONTO, ONT.

Cincinnati to	Route	Page	Miles
Cleveland	154R	90	335.2
Buffalo	155R	90	191.9
Toronto	52R	67	120.1

Total Mileage.....647.2

CLEVELAND, O.-CHEYENNE, WYO.

Cleveland to	Route	Page	Miles
Chicago	155	90	388.1
Cheyenne	1	7	1232.3

Total Mileage.....1610.4

CLEVELAND, O.-LOS ANGELES, CAL.

Cleveland to	Route	Page	Miles
Columbus	154	89	214.9
Los Angeles	2	18	2704.1

Total Mileage.....2919.0

CLEVELAND, O.-MONTREAL, QUE.

Cleveland to	Route	Page	Miles
Buffalo	155R	90	191.9
Montreal	52R	56	538.6

Total Mileage.....730.5

DAYTON, O.-PORTLAND, ORE.

Dayton to	Route	Page	Miles
Lima	152R	88	77.2
Chicago	1	6	245.4
Seattle	3	24	2480.4
Portland	209	96	231.5

Total Mileage.....3034.5

DAYTON, O.-BRETTON WOODS, N. H.

Dayton to	Route	Page	Miles
New York	2R	17	702.6
Bretton Woods	15	41	395.5

Total Mileage.....1098.1

DENVER, COL.-JACKSONVILLE, FLA.

Denver to	Route	Page	Miles
Chicago	1R	5	1132.1
Jacksonville	102	81	1208.4

Total Mileage.....2340.5

DETROIT, MICH.-SEATTLE, WASH.

Detroit to	Route	Page	Miles
Chicago	155R	91	314.3
Seattle	3	24	2480.4

Total Mileage.....2794.7

DETROIT, MICH.-GALVESTON, TEX.

Detroit to	Route	Page	Miles
Toledo	152	88	58.4
Indianapolis	154R	89	245.6
Emporia, Kan.	2	17	676.4
Galveston	206	92	1034.0

Total Mileage.....2014.4

DETROIT-ATLANTIC CITY, N. J.

Detroit to	Route	Page	Miles
Buffalo	155	91	294.7
Albany	52	67	307.6
New York	55	72	149.3
Atlantic City	62	79	153.5

Total Mileage.....905.1

DETROIT-WASHINGTON, D. C.

Detroit to	Route	Page	Miles
Dayton	152	88	215.4
Washington	2	18	467.6

Total Mileage.....683.0

DETROIT-NEW YORK.

Detroit to	Route	Page	Miles
Buffalo	155	91	294.7
Albany	52	67	307.6
New York	55	72	194.3

Total Mileage.....796.6

DETROIT-NEW YORK.

Detroit to	Route	Page	Miles
Lima	152	88	138.2
New York	1	5	651.7

Total Mileage.....789.9

HARTFORD, CONN.-LAKE GEORGE, N. Y.

Hartford to	Route	Page	Miles
Pittsfield	17R	56	75.1
Hudson	16R	51	40.9
Lake George	55R	72	99.0

Total Mileage.....215.0

HARTFORD, CONN.-ATLANTIC CITY, N. J.

Hartford to	Route	Page	Miles
New York	16	54	124.3
Atlantic City	62	79	153.5

Total Mileage.....277.8

HARTFORD, CONN.-KANSAS CITY, MO.

Hartford to	Route	Page	Miles
New York	16	54	124.3
Kansas City	2	17	1353.5

Total Mileage.....1477.8

INDIANAPOLIS, IND.-BOSTON, MASS.

Indianapolis to	Route	Page	Miles
New York	2R	17	811.2
Boston	15R	41	245.7

Total Mileage.....1056.9

INDIANAPOLIS, IND.-BOSTON, MASS.

Indianapolis to	Route	Page	Miles
Toledo	154	89	245.6
Buffalo	155R	91	312.9
Albany	52	67	307.6
Hudson	55	72	33.1
Pittsfield	16	51	40.9
Boston	17R	56	190.6

Total Mileage.....1130.7

KANSAS CITY, MO.-SPOKANE, WASH.

Kansas City to	Route	Page	Miles
Emporia	2	17	134.1
Fargo	206R	92	736.4
Spokane	3	24	1309.5

Total Mileage.....2180.0

MINNEAPOLIS, MINN.-WASHINGTON, D. C.

Minneapolis to	Route	Page	Miles
Chicago	3R	24	488.4
Indianapolis	102	81	196.9
Washington	2R	18	576.2

Total Mileage.....1261.5

MINNEAPOLIS, MINN.-JACKSONVILLE, FLA.

Minneapolis to	Route	Page	Miles
Chicago	3R	24	488.4
Jacksonville	102	81	971.6

Total Mileage.....1460.0

MINNEAPOLIS, MINN.-BOSTON, MASS.

Minneapolis to	Route	Page	Miles
Chicago	3R	24	488.4
Buffalo	155	90	609.6
Albany	52	67	307.6
Hudson	55	72	33.1
Pittsfield	16	51	40.9
Boston	17R	56	190.6

Total Mileage.....1669.6



Thousands of people have been waiting for an opportunity to obtain full and complete information about wire wheels. The realization that wooden wheels were a menace and wire wheels were indestructible, together with their many other advantages such as tire saving, and easy tire changing, has made information concerning them highly desirable.

Besides general wheel information of great value, it gives a listing of all the cars made, explaining sizes and types of wheels and rims, cost of equipment, etc.

Shall we send you your copy?

Houk Manufacturing Co.
1700 Elmwood Ave., BUFFALO, N. Y.



Digitized by Google



HERE IS A LIVE TIP—

Before you start that tour across the plains to the Exposition—in fact, before you start to tour anywhere, drain the old oil from your car's crank case and replenish with **HARRIS CYLINDER OIL**, the lubricant that stands heavy work, extreme heat, and lasts longest. Open up the gear box and refill it with **HARRIS TRANSCOMPOUND**. Likewise see that the rear axle housing is properly supplied.

These are the things that count in touring, and **HARRIS** products are such pure lubricants that they are not only the most efficient, but likewise most economical. *"A Little Goes a Long Way and Every Drop Counts."*

Live dealers, whose trade depends upon satisfying customers, carry in stock **HARRIS OILS and GREASES**.

HARRIS CYLINDER OIL:—Made in three grades and sold in Bbls., Half Bbls., 10 Gal., 5 Gal. and 1 Gal. Cans—and in low flat square one gallon can to fit any standard tool box.

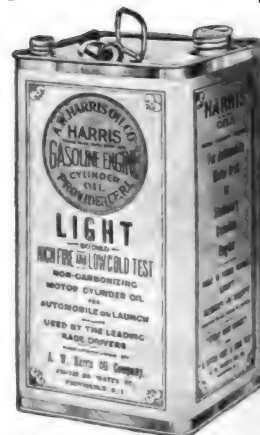
HARRIS OILS are also being put out in iron drums in three sizes, 50 gallon, 30 gallon and 15 gallon quantities. These come equipped with convenient faucets, and are popular with motorists maintaining their own garages.

HARRIS TRANSCOMPOUND:—A transmission oil reduced to the consistency of a grease.

HARRIS SUPERHEATED STEAM CYLINDER OIL:—Expressly prepared for steam driven cars.

HARRIS MOTOR GREASE for grease cups.

HARRIS MOTOR CAR SOAP:—An efficient soap which will not harm the finest surface.



A. W. HARRIS OIL CO.,

326 S. Water St., Providence, R. I. Branch: 143 No. Wabash Ave., Chicago, Ill.



The "Safety First" Tourist is Pyrene Equipped

The danger from fire is estimated to be 85% greater while touring than while at home, where conditions may be wholly or partly controlled. Car insurance does not protect against fire, but a PYRENE fire extinguisher will.

The Cost of a PYRENE fire extinguisher is practically nothing, for any insurance company will reduce the premium you pay 15 per cent. when the car is Pyrene equipped.

This premium reduction is a business proposition with fire insurance companies for the officials understand the efficiency of PYRENE extinguishers and the protection they afford. This premium reduction is your guarantee of PYRENE equipment.

PYRENE fire extinguishers can be carried conveniently in any car, are light in weight, strongly made, instantly available, can be operated by any one, are always dependable and will last indefinitely.

Insure your touring pleasure and reduce your insurance premium.

Pyrene Company of New England

88 Broad Street, Boston, Mass.



Directory of Touring Information

MONTREAL, QUE.-CLEVELAND, O.

Montreal to	Route	Page	Miles
Buffalo	52	66	538.6
Cleveland	155	90	191.9

Total Mileage.....730.5

MONTREAL, QUE.-PITTSBURG, PENN.

Montreal to	Route	Page	Miles
Buffalo	52	66	538.6
Pittsburg	60R	77	252.3

Total Mileage.....790.9

MONTREAL, QUE.-NEW HAVEN, CONN.

Montreal to	Route	Page	Miles
Lake George....	19	61	188.2
Hudson	55	72	182.1
Pittsfield	16	51	40.9
Providence	17	56	159.1
New Haven	15	41	124.3

Total Mileage.....694.6

NEW HAVEN, CONN.-HARRISBURG, PENN.

New Haven to	Route	Page	Miles
New York	15	41	73.6
Philadelphia	2	17	95.6
Harrisburg	60	77	108.3

Total Mileage.....277.5

NEW HAVEN, CONN.-BUFFALO, N. Y.

New Haven to	Route	Page	Miles
Providence	15R	41	124.3
Pittsfield	17R	56	159.1
Hudson	16R	51	40.9
Albany	55R	72	33.1
Buffalo	52R	67	307.6

Total Mileage.....665.0

NEW HAVEN, CONN.-CINCINNATI, O.

New Haven to	Route	Page	Miles
New York	15	41	73.6
Columbus	2	18	634.8
Cincinnati	154	89	120.3

Total Mileage.....728.7

NEWPORT, R. I.-LAKE GEORGE, N. Y.

Newport to	Route	Page	Miles
Fall River	16	53	18.5
Providence	16R	53	19.5
Pittsfield	17R	56	189.1
Hudson	16R	51	40.9
Lake George	35	72	182.0

Total Mileage.....450.1

NEWPORT, R. I.-BRETTON WOODS, N. H.

Newport to	Route	Page	Miles
Fall River	16	53	18.5
Providence	16R	53	19.5
Boston	15R	41	43.7
Bretton Woods..	18R	59	187.2

Total Mileage.....268.9

NEWPORT, R. I.-PHILADELPHIA, PENN.

Newport to	Route	Page	Miles
Ferry to Narragansett Pier.			
New York	15	41	160.7
Philadelphia	2	5	101.5

Total Mileage.....262.2

PHILADELPHIA, PENN.-BRETTON WOODS, N. H.

Philadelphia to	Route	Page	Miles
New York	2R	5	101.5
Boston	15R	41	245.7
Bretton Woods..	18R	59	187.2

Total Mileage.....534.4

PHILADELPHIA, PENN.-LAKE GEORGE, N. Y.

Philadelphia to	Route	Page	Miles
Pocono	60R	78	96.1
Lake George	55	72	402.9

Total Mileage.....498.9

PHILADELPHIA, PENN.-CLEVELAND, O.

Philadelphia to	Route	Page	Miles
Canton, O.	1	5	498.2
Cleveland	154	89	57.8

Total Mileage.....456.0

PITTSBURG, PENN.-DETROIT, MICH.

Pittsburg to	Route	Page	Miles
Lima	1	5	251.4
Detroit	152R	88	138.2

Total Mileage.....389.6

PITTSBURG, PENN.-NASHVILLE, TENN.

Pittsburg to	Route	Page	Miles
Lima	1	5	251.4
Cincinnati	152	88	130.1
Louisville	154	90	136.2
Nashville	102	81	225.3

Total Mileage.....743.0

PITTSBURG, PENN.-ST. LOUIS, MO.

Pittsburg to	Route	Page	Miles
Lima	1	5	251.4
Dayton	152	88	77.2
St. Louis	2	18	351.0

Total Mileage.....679.6

PORTLAND, ORE.-PHOENIX, ARIZ.

Portland to	Route	Page	Miles
Sacramento	209	96	716.7
San Francisco ...	1	5	136.2
Los Angeles	2R	20	496.3
Phoenix	202R	31	576.8

Total Mileage.....1926.0

PORTLAND, ORE.-SALT LAKE CITY, UTAH.

Portland to	Route	Page	Miles
Sacramento	209	96	716.7
Salt Lake City....	1R	5	753.2

Total Mileage.....1469.9

PORTLAND, ME.-DETROIT, MICH.

Portland to	Route	Page	Miles
Boston	15	41	446.2
Pittsfield	17	56	190.6
Hudson	16R	51	40.9
Albany	55R	72	33.1
Buffalo	52R	67	305.6
Detroit	155R	91	294.7

Total Mileage.....1011.1

PROVIDENCE, R. I.-GETTYSBURG, PENN.

Providence to	Route	Page	Miles
New York	15	41	201.0
Gettysburg	1	5	306.3

Total Mileage.....501.3

PROVIDENCE, R. I.-PLATTSBURG, N. Y.

Providence to	Route	Page	Miles
Pittsfield	17R	56	159.1
Hudson	16R	51	40.9
Lake George	55	72	182.1
Plattsburg	19	61	107.0

Total Mileage.....489.1

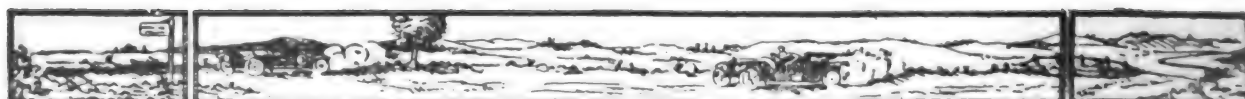
PROVIDENCE, R. I.-ATLANTIC CITY, N. J.

Providence to	Route	Page	Miles
New York	15	41	201.0
Atlantic City	62	79	153.5

Total Mileage.....354.5

PROVIDENCE, R. I.-CHICAGO, ILL.

Providence to	Route	Page	Miles
Pittsfield	17R	56	159.1





Announcement of Policy

THE King Motor Car Company's growth has been conservative. They struck the keynote in the eight-cylinder field by manufacturing a motor car at a price that leaves them without competition.

For the past twelve months the KING EIGHT at \$1350, f. o. b. Detroit, has been the only popular priced eight-cylinder motor car. The KING is one year ahead of the time in the eight-cylinder market. It embodies refinements which builders in its wake cannot equal till time has given them experience.

The KING EIGHT IS NOT A ONE YEAR car. The KING does not and will not rely on radical yearly announcements to stimulate sales. It is, and will continue to be, the policy of the KING MOTOR CAR COMPANY to manufacture a motor car that will be measured by the public as a dependable product.

The King Motor Car Company will make no change this year in the design or price of its present model. The owner of a KING

EIGHT can feel perfectly secure that his model will not become antiquated in a year.

The life of a motor car should be, statisticians say, in the neighborhood of 70,000 miles. You can run your KING EIGHT 8,000 or 10,000 miles a year and still have used only a small fraction of the car's service mileage.

Measure your second-hand value on the fraction of service mileage you have used.

Buy a Motor Car that is growing in popularity
"A ride in a KING is A Revelation"

New England King Agency, 650 Beacon St., Boston.

King Motor Car Co., Detroit, Michigan

Directory of Touring Information

Hudson	16R	51	40.9
Albany	55R	72	33.1
Buffalo	52R	67	307.6
Chicago	155	90	580.0

Total Mileage.....1120.7

PROVIDENCE-ST. LOUIS, MO.

Providence to	Route	Page	Miles
Pittsfield	17R	56	159.1
Hudson	16R	51	40.9
Albany	55R	72	33.1
Buffalo	52R	67	307.6
Chicago	155	90	580.0
St. Louis	153	89	333.8

Total Mileage.....1454.5

PROVIDENCE-ST. LOUIS, MO.

Providence to	Route	Page	Miles
New York	15	41	201.0
St. Louis	2	17	1053.6

Total Mileage.....1254.6

SPRINGFIELD, MASS.-NARRAGANSETT PIER, R. I.

Springfield to	Route	Page	Miles
Walpole	14	54	89.9
Narragansett			
Pier	15	41	54.0

SPRINGFIELD, MASS.-WASHINGTON, D. C.

Springfield to	Route	Page	Miles
Walpole	16	51	89.9
New York	15	41	226.6
Washington	2	17	235.0

Total Mileage.....551.5

SPRINGFIELD, MASS.-RICHMOND, VA.

Springfield to	Route	Page	Miles
Walpole	16	51	89.9
New York	15	41	226.6
Washington	2	17	235.0
Richmond	107	83	121.6

Total Mileage.....673.1

SPRINGFIELD, MASS.-BUFFALO, N. Y.

Springfield to	Route	Page	Miles
Greenfield	18	58	36.9
Pittsfield	17	56	64.1
Hudson	16R	51	40.9
Albany	55R	72	33.1
Buffalo	52R	67	307.6

Total Mileage.....482.6

SPRINGFIELD, MASS.-MONTREAL, QUE.

Springfield to	Route	Page	Miles
Bretton Woods..	18	59	250.5
Portland	15	41	197.2
Montreal	19	61	459.5

Total Mileage.....907.2

WATERBURY, CONN.-WASHINGTON, D. C.

Waterbury to	Route	Page	Miles
New York	15R	41	89.0
Washington	2	17	235.0

Total Mileage.....324.0

WATERBURY, CONN.-ATLANTIC CITY, N. J.

Waterbury to	Route	Page	Miles
New York	15	41	89.0
Atlantic City . . .	62	79	153.5

Total Mileage.....242.5

WATERBURY, CONN.-DETROIT, MICH.

Waterbury to	Route	Page	Miles
Pittsfield	15	41	75.7
Hudson	16R	51	40.9
Albany	55R	72	33.1
Buffalo	52R	67	307.6
Detroit...	155R	91	294.7

Total Mileage.....752.0

WATERBURY, CONN.-WILKES BARRE, PENN.

Waterbury to	Route	Page	Miles
New York	..... 15	41	89.0
Philadelphia	.... 2	17	95.6
Wilkes Barre	... 60	78	128.4

Total Mileage.....313.0

WASHINGTON, D. C.-GREENPORT, L. I.

Washington to Route	Page	Miles
New York 2	17	235.0
Greenport 56	74	115.1

Total Mileage.....350.1

WASHINGTON, D. C.-DETROIT, MICH.

Washington to	Route	Page	Miles
Dayton	2	17	467.6
Detroit	152	88	215.4

Total Mileage.....682.0

WASHINGTON, D. C.-CHICAGO, ILL.

Washington to	Route	Page	Miles
Indianapolis	2	17	576.2

Chicago

Total Mileage.....773.1

WASHINGTON, D. C.-BUFFALO, N. Y.

Washington to	Route	Page	Miles
Philadelphia	2R	17	139.4
Buffalo	60R	78	391.6

Total Mileage.....531.0

WASHINGTON, D. C.-BRETON WOODS, N. H.

Washington to	Route	Page	Miles
New York	..... 2R	17	235.0
Bretton Woods	.. 15	41	395.6

Total Mileage.....630.6

WASHINGTON, D. C.-PORTSMOUTH, N. H.

Washington to	Route	Page	Miles
New York	2R	17	235.0
Portsmouth	15R	41	336.8

Total Mileage.....571.8

WORCESTER, MASS.-PHILADELPHIA, PENN.

Worcester to	Route	Page	Miles
New York	16	51	200.9
Philadelphia	2	17	95.6

Total Mileage.....296.5

WORCESTER, MASS.-CLEVELAND, O.

Worcester to	Route	Page	Miles
New York	16	51	200.9
Canton	1	5	498.2
Cleveland	154	89	57.8

Total Mileage.....756.9

WORCESTER, MASS.-COLORADO SPRINGS, COL.

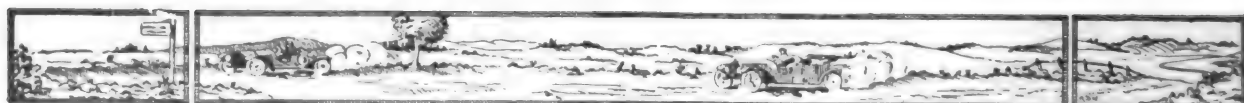
Worcester to	Route	Page	Miles
New York	16	51	200.9
Kansas City	2	17	1354.5
Colorado Springs	201	30	801.8

Total Mileage.....2357.2

NEW YORK, CHICAGO AND SAN DIEGO.

New York to	Route	Page	Miles
Denver	1	5	2129.2
Phoenix	207	93	942.0
San Diego	202	32	438.1

Total Mileage.....3508.3



Announcing the New

Studebaker

Models

For the coming year, Studebaker Dealers will have a **COMPLETE** line of high-grade cars in a variety of models and a range of prices to satisfy the most exacting markets.

The new cars include:

—on the 4-cylinder 40 h. p. chassis:

Touring Car, 7-passenger	\$ 885
Roadster, 3-passenger	850
Landau-Roadster, 3-passenger	1185
Commercial Cars—	
Delivery Car, panel body	875
Delivery Car, express body	850
Station and Baggage Wagon	875

—on the 6-cylinder 50 h. p. chassis:

Touring Car, 7-passenger	1050
Roadster, 3-passenger	1000
Landau-Roadster, 3 passenger	1350
Coupe, 4-passenger	1550
Limousine, 7-passenger	2250

Prices are F. O. B. Detroit

Without exception, the coming year will be the most successful year that Studebaker Dealers have ever had.

The new cars are the **BEST** that Studebaker has ever built—**QUALITY** cars in every detail. The prices are epoch-making—and mark a new era in the manufacture of high-grade cars.

But even more important from the Studebaker Dealer's view, is the fact that now he will have a **COMPLETE** line of Studebakers—a car for every possible buyer, whether that buyer desires a touring car, a roadster or a closed car.

Not a sale need be lost. And not a car need be sold with the slightest apprehension of dissatis-

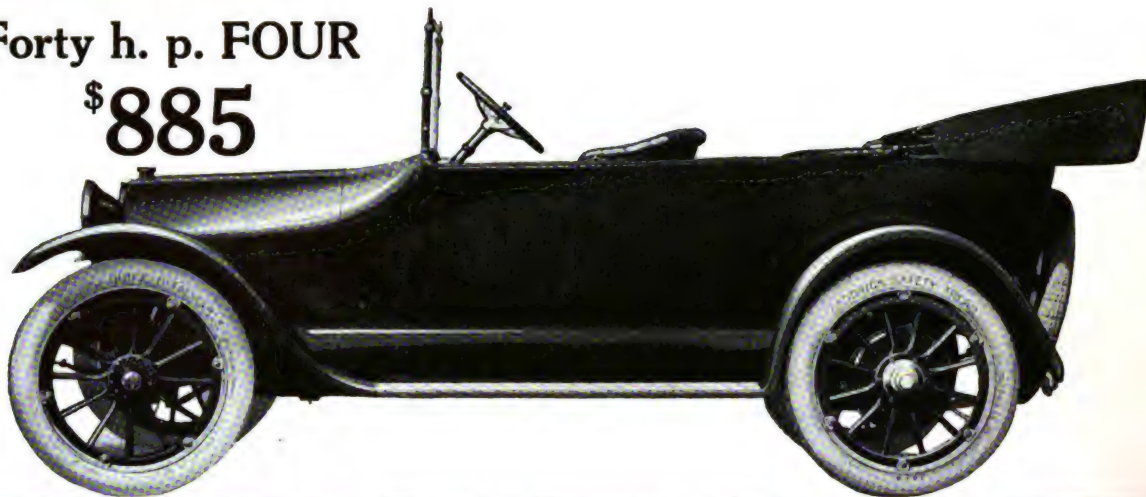
faction. For although Studebaker has always built a **QUALITY** car, these new models set a new and higher standard even for Studebakers.

Some territory is as yet unoccupied, and Studebaker will be pleased to supply complete data to any merchants who may wish to take up the matter of a Studebaker dealership. The new form of Dealer's Agreement now in use in the fairest contract of its kind ever written. And the newly developed scheme of localized sales co-operation will be of intense interest to every progressive merchant of cars.

Address the Sales Dept., Studebaker Corporation of America, Detroit, Mich.

Studebaker

Forty h. p. FOUR
\$885



In this new car, Studebaker Dealers will have a value that overmatches any and all competition in the 4-cylinder market.

It is a big car, extraordinarily roomy, and easily carries 7 passengers, but the two auxiliary seats in the tonneau, fold down into the floor, disappearing completely and making a very roomy 5-passenger car. It is a FULL 40 h. p. car—the most powerful car ever offered within hundreds of dollars of its price.

But aside from those advantages, it is one of the highest grade cars ever built at any price. We are frank to say that our profit is less on this car than on any other we ever built. It costs us more to manufacture. And set down side by side with other cars, at lower prices, the difference in quality stands out so plainly that Studebaker Dealers will have no difficulty in convincing buyers that this car is a much better investment—and that it is absolutely unnecessary to pay more for a 4-cylinder car.

SPECIFICATIONS IN BRIEF

Motor—4 cylinder cast in bloc—high-speed long stroke type. 5-inch stroke; bore increased to 3½ inches. Full 40 h. p.—(41.5 h. p. on brake-test).

Carburetor—1¼ inch Studebaker-Schebler carburetor. Adjustable from dash. Anti-rumble gasoline tank in cowl.

Ignition—Generator and battery system—6-volt Willard Storage Battery—Remy Coil and Remy Distributor.

Cooling—Improved force pump, larger tubular radiator, 6-blade, 16-inch ball-bearing fan.

Oiling—Circulating splash system—gear driven pump—pressure gauge on dash.

Clutch—Cone type. Leather faced.

Transmission—Selective—by sliding gears—has 3 speeds forward and one reverse.

Rear Axle—Studebaker FULL floating axle.

Larger Timken bearings—two in each hub.

Shaft removable without disturbing wheels or differential.

Brakes—Large easy-setting, tight gripping—15 x 7 inch brake drum, faced with anti-horn Multibestos. Brake equalizer of most improved type—set on rear axle.

Springs—Semi-elliptic, 38-inch, 7-leaf springs in front, three-quarter elliptic, 51-inch spring, 9-leaf in rear. Understeering in rear.

Bodies—7 passenger capacity. Built complete by Studebaker. Steel panels invisibly welded. Seats are lower, larger and wider. Deeply upholstered with highest grade, hand-buffed, straight grain leather—semi-bright finish and parallel tufting.

Finish—A deep, lasting, exclusive shade of Blue—put on through a series of 25 finishing operations.

Top—One-man top—metal bow holders, rubber-lined to prevent rattling or cutting fabric.

Curtains—Studebaker-stowaway self-contained in top and adjustable from within.

Electrical Starting and Lighting System—Wagner two unit, built especially for Studebaker, light, compact and perfectly reliable.

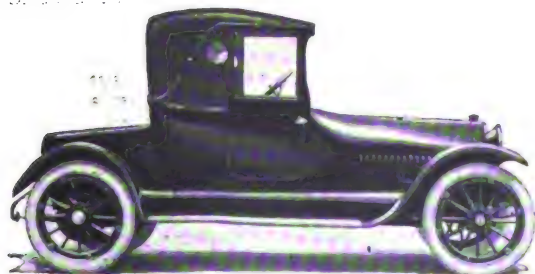
All wiring carried in heavier steel tubing—can be removed as a unit.

Windshield—Studebaker full-width, storm-proof built in type, with solid supports; adjustable for rain and clear vision, also for ventilation.

Tires—Larger. Goodrich 34 x 4 straight side tires. Safety tread on rear wheels.

Wheels—Artillery type—solid growth hickory. Demountable quick-detachable spring rim with new locking device that snaps tires off without effort.

Fenders—Crown design—Deeper and richer in finish than ever. Finished with new FLEXIBLE Studebaker enamel baked in. Wheelbase—114 inches.



3-Passenger Landau-Roadster

—on 6 cylinder, 50 h. p. chassis	\$1350
—on 4 cylinder, 40 h. p. chassis	1185

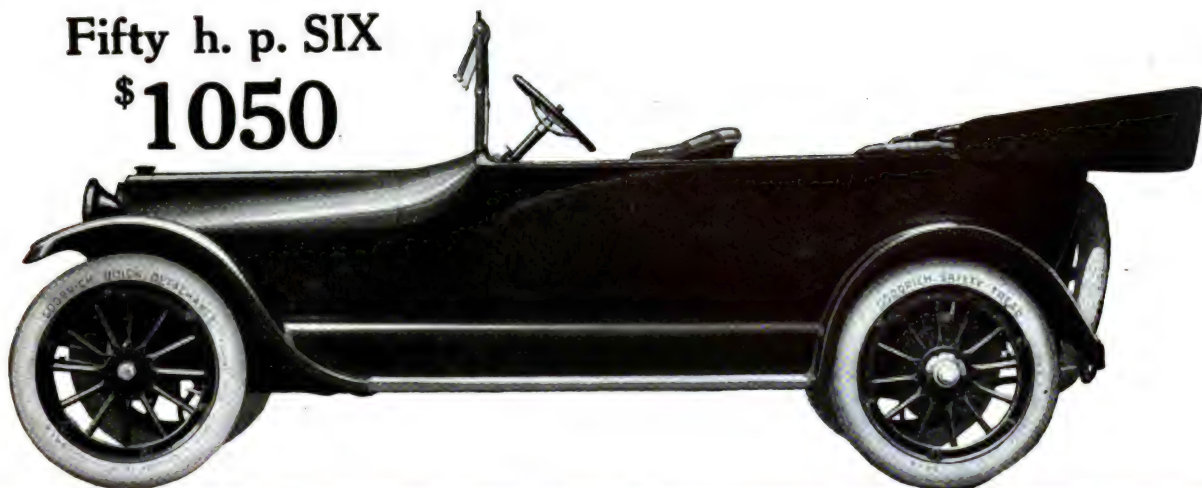


3-Passenger Roadster

—on 6 cylinder, 50 h. p. chassis	\$1000
—on 4 cylinder, 40 h. p. chassis	850

Studebaker

Fifty h. p. SIX
\$1050



With this new SIX, the big and powerful car that it is, the Studebaker Dealer has a car that will instantly appeal to every prospective buyer of a SIX in his territory.

Any SIX at \$1050 would attract immediate and wide-spread attention. But when buyers find at that price of \$1050 a BIG 7-passenger SIX as handsome as this, with a 50 h. p. motor and Studebaker QUALITY evidenced in every detail—it takes little imagination to foresee the record-breaking demand there will be for this car.

SPECIFICATIONS IN BRIEF

Motor—6 cylinder cast en bloc—high-speed long stroke type—5-inch stroke; bore increased to 3 1/4 inches. Full 50 h. p.—(54.5 h. p. on brake-test).

Carburetor—1 1/4 inch Studebaker-Schebler carburetor, built especially for this motor. Adjustable from dash. Anti-rumble gasoline tank in cowl.

Ignition—Generator and battery system—6-volt Willard Storage Battery—Remy Coil and Remy Distributor.

Cooling—Improved force pump, larger tubular radiator. 6-blade, 18-inch ball bearing fan.

Oiling—Circulating splash system gear driven pump—pressure gauge on dash.

Clutch—Cone type. Leather faced.

Transmission—Selective—by sliding gears—has 3 speeds forward and one reverse.

Rear Axle—Studebaker FULL-floating axle. Larger Timken bearings—two in each hub. Shaft removable without disturbing wheels or differential.

Brakes—Large easy-acting, tight gripping—15 x 2 inch brake drum, faced with anti-

burn Multibestos. Brake equalizer of most improved type—set on rear axle.

Springs—Semi-elliptic, 18-inch, 7 leaf springs in front, three-quarter elliptic, 51-inch spring, 9-leaf in rear. Underling in rear.

Bodies—7-passenger capacity. Built complete by Studebaker. Steel panels invisibly welded. Seats are lower, larger and wider. Deeply upholstered with highest grade, hand-buffed, straight grain leather—semi-bright finish and parallel tufting.

Finish—A deep, lasting, exclusive shade of Blue—put on through a series of 25 finishing operations.

Top—One-man top—metal bow-holders, rubber-lined to prevent rattling or cutting fabric.

Curtains—Studebaker-stowaway self-contained in top and adjustable from within.

Electrical Starting and Lighting System—Wagner two unit, built especially for Studebaker, light, compact and perfectly reliable.

All wiring carried in heavier steel tubing—can be removed as a unit.

Windshield—Studebaker full-width, storm-proof built-in type, with solid supports; adjustable for rain and clear vision, also for ventilation.

Tires—Goodrich 34 x 4 straight side tires. Safety tread on rear wheels.

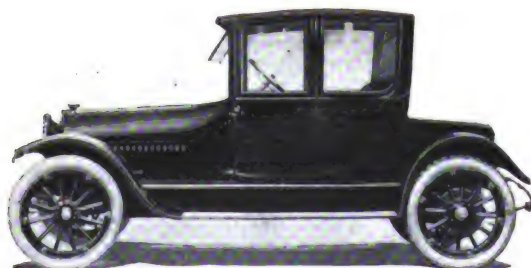
Wheels—Artillery type—second growth hickory. Demountable quick detachable spring-rim with new locking device that snaps tires off without effort.

Fenders—Crown design—Deeper and richer in finish than ever. Cling closely to curves. Finished with new FLEXIBLE Studebaker enamel baked in.

Wheelbase—122 inches.

Also, a New
Limousine
at \$2250

a big, roomy, luxurious, 7-passenger carembodying every late refinement. One of the handsomest cars ever built. Photos not ready when this publication goes to press. Write for special photos.



4-Passenger Coupe

—only on 6 cylinder 50 h. p. chassis at

\$1550

Studebaker

Commercial Cars

Delivery Car, Panel Body	- - - - -	\$875
Express Wagon	- - - - -	850
Station Wagon	- - - - -	875

Studebaker Dealers are extremely fortunate in having in this new Commercial Car a vehicle that sums up the DOUBLE experience of Studebaker in manufacturing motor cars and delivery vehicles of every nature.

It is a new car, MORE POWERFUL than ever, designed and manufactured solely for commercial purposes and is one of the most economical cars on the market. And every detail of the car is built with the exacting care that characterizes the manufacture of the pleasure cars. It is a QUALITY car that Studebaker Dealers can sell with the certainty of satisfaction.

Any Dealer or merchant who wants a line of commercial cars for which a strong demand already exists, is invited to write for full particulars.

SPECIFICATIONS IN BRIEF

Motor—4 cylinders— $3\frac{1}{4}$ inch bore, 5 inch stroke. Full 40 horsepower.

Lubrication—Force pump circulating splash system—gear driven pump—pressure gauge on dash. Sure and economical.

Cooling—Centrifugal force pump—larger radiator of tubular type.

Ignition—Studebaker-Remy system from storage battery.

Carburetor—Studebaker-Schebler—built especially for this motor.

Electric Starting and Lighting System—Studebaker-Wagner system—two unit system—proved good by four years' successful use on Studebaker delivery cars.

Rear Axle—Studebaker FULL-floating axle—two Timken bearings in each hub.

Brakes—large, easy-acting, tight-gripping brakes with 15 x 2 inch drums. Equalized.

Tires—34 x 4 inch—Goodrich.

Steering—Irreversible type, left hand drive, center control.

Springs—Studebaker famous springs—semi elliptic, 38-inch springs in front; three-quarter elliptic, 51-inch springs in rear.

Wheel Base—112 inches. Completely equipped.

Photographs not ready when this publication went to press. Write at once for photos and complete specifications of the new Studebaker Commercial Cars.



To the Pacific Expositions.

ALTHOUGH it is only a little more than a year and a half since the Lincoln Highway Association was formed and began its propaganda for a great transcontinental road to be built in honor of Abraham Lincoln, tremendous progress has been made toward the accomplishment of its plans.

The project, backed by influential men who have been able to command the utmost co-operation from the press, commercial bodies and other organizations, has taken hold firmly of the American imagination and work on the road is progressing with startling rapidity.

Over 2500 miles of road has been marked with Lincoln highway road markers, so that it is as easily followed as a city street. Scores of cities have renamed the

streets over which the route passes, "Lincoln Way."

Much construction of the concrete type, which has been adopted as standard for the road, has already been accomplished and great strides have been made in improving the road in the places where it has already been paved with some other material.

All this has made the transcontinental trip very much easier than it has been at any time in the past. There is now very little of the hardship which was to some extent still encountered even a year ago.

From one end of the route to the other there is scarcely a mile that has not some special interest historically or scenically. From Chicago west it follows the Old Overland trail, along which thousands in the days of '49 pushed

forward with their prairie schooners toward the coast. Indian fights, massacres, all the stirring and dramatic incidents of frontier life occurred here.

In the east the road passes through a country where memorable struggles of the Revolution, the War of 1812 and the War of Secession had their setting. In addition some of the most striking and impressive natural beauty that the country has to offer is presented to the traveller.

The start of the tour for the easterner begins in New York City. At Jersey City he comes upon the old Essex-Hudson plank road, which for over 100 years has been one of the main travelled thoroughfares of the state. It has just recently been converted at large cost into a splendid boulevard, bordered by wide side-



A Bridge Over a Mountain Stream in Nevada.

walks and studded with electric lights. It has changed its name from the "Plank Road" to the "Lincoln Highway."

These New Jersey roads are about as perfect as any that are to be found in America. The route runs through a charming rural country, through the famous college town of Princeton to Trenton, the capital of New Jersey. The Delaware is crossed on a bridge not far from the point where Washington loaded his army in skiffs and took them across through ice jams during the revolution.

The river is followed to Philadelphia through a charming wood belt studded with many pretty villages until the city suburbs and factory districts are reached. From the city, which is itself of the greatest possible interest to the country in a historical way, the route goes west, passing through Valley Forge, where Washington and his men starved and froze all one terrible winter. A classic chapel near Paoli has been built to commemorate the bravery of the men who suffered there.

Along the road beyond Valley Forge the men of many armies have marched. Every little way there are markers describing events stirring to the patriotic American. Along the Old Lancaster pike, long one of the finest roads on the continent, the tourist goes to the town of that name. It is the centre of one of the richest farming counties in America.

Then there is Columbia, touched in the Civil War by Lee's army in one of its northern drives. York,

which is the Yorktown that gave its name to a revolutionary battle, and thence to Gettysburg, where Meade in the most gigantic struggle of the Civil War checked the advance of the South and won the first telling victory for the Federals in the East.

The battlefield and the national cemetery, marked by many monuments, are passed. It was at the dedication of this cemetery that Lincoln read from the back of a tattered envelope one of the finest pieces of English prose that was ever written.

At Chambersburg an arch has been erected telling of the passage of Lee's army along the same road on their way to their great defeat. This was erected on the 150th anniversary of the founding and 50th of the burning of Cham-

bersburg by the Confederates. Over excellent roads the route continues west through Bedford and Ligonier to Pittsburg.

Already the road through this section has been thoroughly marked and near Bedford large roadside mirrors have been erected at sharp turns so that motorists can look around the corner at any vehicle approaching. This arrangement is very useful in avoiding accidents.

Out of Pittsburg to the west the road goes through Beaver on the charmingly wooded banks of the Ohio river and on to East Liverpool. This section of Ohio is the centre of the pottery industry of the United States. Many large factories turn out earthenware of all types.

Crossing the Ohio river the motorist goes along a road that is receiving the direct attention of the state highways department and is surfaced most of the way with the brick paving which is coming to be standard pavement on the main roads of Ohio.

The paving of the Lincoln highway will be completed this year and it is likely that, from the energetic measures taken by the state highway department, the entire road across Ohio will be thoroughly paved and placed under an efficient system of maintenance before another year has passed.

Another Ohio city on the route is Canton, where William McKinley lies under a monument of rare beauty and great impressiveness. Across Ohio the road goes in an al-



New Pass Canon in Nevada.



Pleasant Combination of River and Mountain Views, Characteristic of Eastern Pennsylvania.

most straight line through Mansfield, Bucyrus, Upper Sandusky and Lima, and then the tourist enters Indiana, coming first to Fort Wayne.

Cities along this part of the highway are placing across the road arches and signs giving the distances to New York and San Francisco, and the names and population of their communities. Such a sign illuminated at night by electric lights has already been erected at Goshen, Ind., and one is planned for Fort Wayne in the near future.

Elkhart, Ind., is a centre of enthusiastic sentiment for the Lincoln highway and the first section of the road to be constructed in the state according to the standard concrete specifications, was opened there last fall before a gathering of 200 automobile parties, made up mostly of the residents of the county, a great many of whom were farmers.

South Bend is located on the road at the point where tourists from Indianapolis and from all over Michigan strike it on their way to Chicago and is already a centre of a surprising large cross-country automobile traffic.

The next cities are La Porte and Valparaiso. The latter is the seat of Valparaiso university, which has more students than any other institution in the United States. It is a quiet and very attractive college town.

A bond issue of \$80,000 has

been passed by Kankakee and Wills townships to improve the road between South Bend and La Porte. In entering Illinois the road passes 18 miles south of Chicago, which can be reached—and of course will be reached by the great majority of travellers—by a detour over very excellent roads.

Illinois roads are not quite up to the standard of some of the other states, but there is promise of much improvement in the immediate future. At Dixon, Ill., is a marker showing the point at which in 1856 Lincoln delivered his speech in one of the famous Lincoln-Douglas debates, which were part of his candidacy for the

presidency of the United States.

Mooseheart, Ill., is the national headquarters of the Loyal Order of the Moose, one of the largest, in point of membership, of all of the fraternal orders. The vocational school, which it conducts, is located here. The order has built at its own expense a mile of concrete road according to the standard specifications.

The Illinois State Highway department is concentrating its energies at present upon the Lincoln highway and many counties throughout the state have raised money for its improvement. In some of them nearly \$50,000 will be spent during the current year. Eight thousand barrels of cement have been placed in the state by the Lincoln Highway Association for the construction of seedling miles. Two convict camps near Joliet are at work on the road.

Through Iowa the tourist sees one of the most prosperous farming sections in the United States. This great wheat and corn belt is full of farmers who own their own motor cars and who are enthusiastic advocates of good roads. The route lies through Clinton, Cedar Rapids, Marshalltown and Jefferson to Council Bluffs. All of these cities are prosperous centres of flourishing rural communities.

At Council Bluffs the Missouri river is crossed into Nebraska. At North Platte, where the Platte river is crossed, a new \$50,000 steel bridge is to be constructed to take the place of the present wooden structure.

East of this point the best of accommodations have always



Nearing a Railroad in the Great Desert.

been available, and from here on to the Pacific coast it is possible, if no accidents intervene, to make places at noon and at night where supplies and food may be had. Still it is better to be on the safe side by carrying food and water in the car and being prepared in case of emergency to camp in the open for the night. The furthest distance between towns or ranches which will accommodate strangers at any point in the road is 80 miles. The road is well marked throughout and is easy to follow.

In Nebraska the tourist comes upon the famous western dirt roads, which are maintained at a high state of perfection by dragging and rolling at regular inter-

plainly appreciable in the quality of the atmosphere.

Cheyenne is a modern city, but not long ago it was one of those wild frontier places whose life and doings are of such consuming interest to the moving picture public. Yet every year one of the great events is Frontier Day, when cowboys and daring horsemen from every part of the West gather to demonstrate to an appreciative modern assembly the arts for which the West was famous in the days of the great cattle ranges. Here also is a great automobile speedway—the largest west of Indianapolis, where races are held every year.

Through Wyoming the tourist

of the sage brush—the great American desert. Great Salt Lake, the American Dead sea, is fading rapidly from the sands. On its shores is a wonderful city, where the Mormons have made the desert blossom like a rose.

The wonderful church architecture of the city is one of the most interesting sights of its kind in America. The climate is exceptionally fine.

The salt beds of Utah south of Great Salt Lake make a fine hard surfaced road, and one over which it is safe to make as high a speed as the car is capable of. The tourist enters the State of Nevada near Tippet's ranch. And from here three days of driving, stopping at



Where the Lincoln Highway Enters the Rocky Mountain District—Beginning the Winding Ascent of the Emigrant Gap Route.

vals. Three-fourths of the length of the Lincoln highway in the State of Nebraska is treated regularly in that way.

The tourist goes straight west across the state through a splendid farming country most of the way to Big Springs and Cheyenne, Wyo. The latter part of the distance to Cheyenne discloses some exceedingly picturesque scenery.

The Rockies are now in full view, although up to this point no appreciable grades have been encountered. Plains stretch out in every direction, with here and there a spot of vivid green to show where alfalfa is being cultivated. As the altitude is 5700 feet, it is

will find some of the rarest scenic treats that are offered by a trip over the Lincoln highway. He sees the grandeur of the Yellowstone, the geysers, the hot springs and the falls. Over improved roads he goes through the thick western woods along the foot of precipitous cliffs, along the side of towering mountains. Game abounds in the country near the road and the streams, some of them, offer the rarest sport to the angler.

From Cheyenne the tourist goes to Evanston, Wyo., and thence to Ogden, Utah, and Salt Lake City. Between these latter two towns the road is as good as the best in the East. This is now the land

night in ranch houses, lands the tourist at Reno, famous once for divorces and prize fights. Stations have been established all the way across the great desert, at which oil and gasoline are obtainable. It is hard now to appreciate that not so long ago men took their lives in their hands when they set out on this trip.

The population of Nevada is very sparse. There are only a few thousand people in the whole state. Yet the territory is greater than that of Ohio and Pennsylvania put together. It is of course impossible to tax so small a population for the construction of fine roads across the state, and for that reason work on this section



Narrow Road Around a Desert Mound.

of the road may be expected to proceed slowly unless it is done by outside aid. But very little improvement is necessary, as the surface of the country makes an ideal roadway, and it is possible now to drive most of the distance across the state at speeds up to 45 miles an hour.

There are two routes from Reno to California. Through Carson City and along the shores of the beautiful Lake Tahoe, or further north by way of Truckee. California roads are already among the most famous in America and these perfected thoroughfares are being further perfected every year by the most aggressive and effective of good roads movements.

Snow-capped mountains, sparkling blue lakes and beautiful orange groves in the fertile parts of the state offer a great and interesting variety of scenery. In places are the signs of old hydraulic mining methods by means of which the forty-niners got the gold from the earth, and the old lumber mills, which preceded the mines, have left traces in some places.

In the Sierras the road reaches a height of 7000 feet above the sea level, with the brilliant blue of Donner lake sparkling below.

Turning south at Sacramento the tourist reaches Stockton, and after a short drive comes to Oakland, where the route ends. A short ferry ride from Oakland brings him to San Francisco the seat of the great Panama Pacific Exposition.

Every effort has been made by the Lincoln Highway Association

to make the trip over the route as pleasant as possible. In every town of importance along the way the association has an official known as a local consul, who will make it his business to aid tourists in every way possible, with information or help in getting supplies, repairs or accommodations.

Large traffic over the route is expected and travellers will find towns people everywhere alert to serve them.

ITINERARY NO. 1.

Night Stops—New York City, Philadelphia, Gettysburg, Bedford and Pittsburg, Penn.; Canton and Lima, O.; South Bend, Ind.; Chicago, Ill.; Clinton and Marshalltown, Ia.; Omaha and

Kearney, Neb.; Julesburg and Denver, Col.; Cheyenne, Rawlins and Green River, Wyo.; Salt Lake City and Kearney's Ranch, Utah; Ely, Austin and Reno, Nev.; Sacramento and San Francisco, Cal. Twenty-Four Days, 3174.7 Miles.

New York-Philadelphia, 101.5 Miles.

Ferry to Jersey City, N. J.

	Miles to	Total Miles Out Return
Jersey City.....	0.0	0.0 101.5
Newark	10.1	10.1 91.4
West Elizabeth..	4.2	14.3 87.2
Elizabeth	2.0	16.3 85.2
Iselin	10.9	27.2 74.3
Metuchen	2.1	29.3 72.2
New Brunswick..	5.5	34.8 66.7
Franklin Park..	6.2	41.0 60.5
Kingston	6.8	47.8 53.7
Princeton	3.0	50.8 50.7
Lawrenceville ..	5.1	55.9 45.6
Trenton	5.9	61.8 39.7
White Horse ...	4.1	65.9 35.6
Bordentown	3.1	69.0 32.5
Columbus	5.4	74.4 27.1
Burlington	7.5	81.9 19.6
Bridgeboro	5.2	87.1 14.4
Cinnaminson....	3.9	91.0 10.5
Camden	8.5	99.5 2.0
Philadelphia	2.0	101.5 0.0
Philadelphia-Gettysburg, 118.7 Miles.		

	Miles to	Total Miles Out Return
Philadelphia	0.0	0.0 118.7
Ardmore	9.4	9.4 109.3
Bryn Mawr.....	2.1	11.5 107.2
Wayne	3.9	15.4 103.3
Devon	1.5	16.9 101.8
Berwyn	1.4	18.3 100.4
Dalesford	1.2	19.5 99.2
Paoli	1.2	20.7 98.0
Malvern	1.5	22.2 96.5
Whitford	7.4	29.6 89.1
Downington	3.3	32.9 85.8
Coatesville	6.6	39.5 79.2



Mountain Highway in Colorado.



In the Valley of the Truckee River. Near the Nevada-California Boundary Line, on the Way to Lake Tahoe.

Ladsburyville	3.9	43.4	75.3
Strasburg	10.2	53.6	65.1
Paradise	2.7	56.3	62.4
Lancaster	9.6	65.9	52.8
Columbia	10.2	76.1	42.6
Wrightsville	1.9	78.0	40.7
York	11.8	89.8	28.9
Thomasville	7.1	96.9	21.8
Abbotstown	7.7	104.6	14.1
New Oxford	4.2	108.8	9.9
Gettysburg	9.9	118.7	0.0

Gettysburg-Bedford, 80.1 Miles.

	Miles to	Total Miles	Out Return
Gettysburg	0.0	0.0	80.1
Seven Stars	3.9	3.9	76.2
McKnightstown	1.9	5.8	74.3
Cashtown	1.9	7.7	72.4
Fayetteville	11.4	19.1	61.0
Chambersburg	5.5	24.6	55.5
St. Thomas	7.4	32.0	48.1
Fort London	6.0	38.0	42.1
McConnellsburg	8.1	46.1	34.0
Harrisonville	6.4	52.5	27.6
Breeswood	11.4	63.9	16.2
Everett	8.4	72.3	7.8
Mt. Dallas	1.1	73.4	6.7
Bedford	6.7	80.1	0.0

Bedford-Pittsburg, 100 Miles.

	Miles to	Total Miles	Out Return
Bedford	0.0	0.0	100.0
Wolfsburg	2.5	2.5	97.5
Schellsburg	6.9	9.4	90.6
Buckstown	13.5	22.9	77.1
Stoyestown	2.0	24.9	75.1
Jenners	10.7	35.6	64.4
Jennerstown	1.0	36.6	63.4
Laughlinstown	8.8	45.4	54.6
Ligonier	3.0	48.4	51.6
Youngstown	9.1	57.5	42.5
Greensburg	10.0	67.5	32.5
Grapeville	4.1	71.6	28.4
Adamsburg	2.3	73.9	26.1
Irwin	3.0	76.9	23.1
Jacksonville	1.2	78.1	21.9
Cireleville	0.6	78.7	21.3
E. McKeesport	5.8	84.5	15.5
Wilmerding	1.5	86.0	14.0
Wilkinsburg	6.7	92.7	7.3
Pittsburg	7.3	100.0	0.0

Pittsburg-Canton, 97.9 Miles.

	Miles to	Total Miles	Out Return
Pittsburg	0.0	0.0	97.9

Jefferson	4.4	34.5	119.0
Reedsburg	4.5	39.0	114.5
Jeromenville	4.7	43.7	109.8
Hayesville	4.5	48.2	105.3
Mifflin	5.5	53.7	99.8
Mansfield	8.3	62.0	91.5
Ontario	6.6	68.6	84.9
Gallon	8.4	77.0	76.5
Bucyrus	11.0	88.0	65.5
Osceola	6.5	94.5	59.0
Upper Sandusky	10.0	104.5	49.0
Forest	14.0	118.5	35.0
Patterson	1.8	120.3	33.2
Dunkirk	6.0	126.3	27.2
Ada	10.3	136.6	16.9
Lima	16.9	153.5	0.0

Lima-South Bend, 144.3 Miles.

	Miles to	Total Miles	Out Return
Lima	0.0	0.0	144.3
Elida	6.5	6.5	137.8
Delphos	9.3	15.8	128.5
Van Wert	13.3	29.1	115.2
Convoy	6.7	35.8	108.5
New Haven, Ind.	21.2	57.0	97.3
Fort Wayne	6.4	63.4	90.9
Churubusco	14.5	77.9	66.4
Noblesville	7.3	85.2	59.1
Wolf Lake	4.5	89.7	54.6
Kimmell	5.0	94.7	49.6
Ligonier	5.5	100.2	44.1
Millersburg	9.2	109.4	34.9
Goshen	9.4	118.8	25.5
Dunlap	4.7	123.5	20.8
Elkhart	5.5	129.0	15.3
Osceola	6.0	135.0	9.3
Mishawaka	5.3	140.3	4.0
South Bend	4.0	144.3	0.0

South Bend-Chicago, 101.1 Miles.

	Miles to	Total Miles	Out Return
South Bend	0.0	0.0	101.1
New Carlisle	13.6	13.6	87.5
La Porte	12.3	25.9	75.2
Pinhook	8.4	34.3	66.8
Westville	2.7	37.0	64.1
Valparaiso	10.3	47.3	53.8
Wheeler	7.5	54.8	46.3
Hobart	5.2	60.0	41.1
Gary	4.0	64.0	37.1
Highlands	7.4	71.4	29.7
Hessville	2.3	73.6	27.5
Gibson	1.1	74.7	26.4
Grassell	1.0	75.7	25.4
Calumet	0.9	76.6	24.5
East Chicago	1.1	77.7	23.4
Whiting	3.0	80.7	20.4

Canton-Lima, 153.5 Miles.

	Miles to	Total Miles	Out Return
Canton	0.0	0.0	153.5
Massillon	8.0	8.0	145.5
Brookfield	2.3	10.3	143.2
Greenville	3.0	13.3	140.2
Dalton	3.9	17.2	136.3
East Union	6.3	23.5	130.0
Wooster	6.6	30.1	123.4



Sage Brush and Buttes Near Eureka, Nev.



An Old Stone House at Fish Springs, Utah.

South Chicago...	5.3	86.0	15.1
Bryn Mawr	3.6	86.0	12.1
Chicago	12.1	101.1	0.0

Chicago-Clinton, 147.5 Miles.

	Miles to	Out	Return	Total Miles
Chicago	0.0	0.0	147.5	
Austin	7.9	7.9	139.6	
Oak Park	3.4	11.3	136.2	
Maywood	0.8	12.1	135.4	
Elmhurst	5.3	17.4	130.1	
Lombard	4.1	21.5	126.0	
West Chicago...	9.1	30.6	116.9	
Geneva	5.5	36.1	111.4	
Elburn	8.4	44.5	103.0	
De Kalb	15.8	60.3	87.3	
Creston	11.2	71.5	76.0	
Rochelle	6.1	77.6	69.9	
Ashton	12.0	89.6	57.9	
Franklin Groves...	4.6	94.2	53.3	
Dixon	9.7	103.9	43.6	
Sterling	14.4	118.3	29.3	
Emerson	3.6	121.9	25.6	
Morrison	10.7	132.6	14.9	
Union Grove...	3.7	136.3	11.2	
Fulton	7.6	143.9	3.6	
Lyons, Ia.	1.3	145.2	2.3	
Clinton	2.3	147.5	0.0	

Clinton-Marshalltown, 167.4 Miles.

	Miles to	Out	Return	Total Miles
Clinton	0.0	0.0	167.4	
Elvira	9.5	9.5	157.9	
De Witt	11.6	21.1	146.3	
Grand Mount...	5.7	26.8	140.6	
Wheatland	10.3	37.1	130.3	
Lowden	6.2	43.3	124.1	
Clarence	8.5	51.8	115.6	
Mechanicsville...	10.8	62.6	104.8	
Edson	7.0	69.6	97.8	
Mt. Vernon	1.8	71.4	96.0	
Marion	13.2	84.6	82.8	
Oedar Rapids ..	5.8	90.4	77.0	
Belle Plaines...	36.5	126.9	40.5	
Chelsea	6.5	133.4	34.0	
Tama	11.5	144.9	22.5	
Montour	8.5	153.4	14.0	
Marshalltown...	14.0	167.4	0.0	

Marshalltown-O m a h a, 219.3 Miles.

	Miles to	Out	Return	Total Miles
Marshalltown ..	0.0	0.0	219.3	
State Center ..	14.5	14.5	204.8	
Cole	8.8	23.3	196.0	
Nevada	7.3	30.6	188.7	

Ames	8.3	45.8	150.7
North Bend....	8.2	54.0	142.5
Rogers	7.2	61.2	135.3
Schuyler	8.2	69.4	127.1
Benton	8.9	78.3	118.2
Columbus	7.6	85.9	110.6
Duncan	8.7	94.6	101.9
Silver Creek....	8.3	102.9	93.6
Ravens	5.7	108.6	87.9
Clarks	5.5	114.1	82.4
Central City....	12.9	127.0	69.5
Chapman	5.8	132.8	63.7
Grand Island....	17.3	150.1	46.4
Alda	8.0	158.1	38.4
Wood River	10.0	168.1	28.4
Shelton	8.5	176.6	19.9
Gibbon	6.2	182.8	13.7
Huda	8.5	191.3	5.2
Kearney	5.2	196.5	0.0

Kearney-Julesburg, 196.5 Miles.

	Miles to	Out	Return	Total Miles
Kearney	0.0	0.0	196.5	
Odessa	9.6	9.6	186.9	
Elm Creek	7.0	16.6	179.9	
Overton	9.9	26.5	170.0	
Lexington	10.3	36.8	159.7	
Conad	18.3	55.1	141.4	
Willow Island ..	5.1	60.2	136.3	
Gothenburg	7.8	68.0	128.5	
Brady Island	13.3	81.3	115.3	
Maxwell	9.4	90.7	105.8	
North Platte	15.6	106.3	90.3	
Hershy	13.6	119.9	76.6	
Sutherland	6.6	126.5	70.0	
Paxton	12.2	138.7	57.8	
Korty	6.8	145.5	51.0	
Roscoe	6.1	151.6	44.9	
Ogalalla	7.3	158.9	37.6	
Brule	11.0	169.9	26.6	
Julesburg, Col...	26.6	196.5	0.0	

***Julesburg-Denver, 204.9 Miles.**

	Miles to	Out	Return	Total Miles
Julesburg	0.0	0.0	204.9	
Ovid	8.3	8.3	196.6	
Sedgwick	8.3	16.5	188.4	
Red Lion	10.5	27.0	177.9	
Crook	6.9	33.9	171.0	
Proctor	8.3	42.2	162.7	
Iliff	7.4	49.6	155.3	
Sterling	12.3	61.9	143.0	
Atwood	6.5	68.4	136.5	
Merino	6.0	74.4	130.5	
Hillrose	19.2	93.6	111.3	
Brush	9.7	103.3	101.6	
Fort Morgan	9.5	112.8	92.1	
Morville	35.5	148.3	56.6	



A Great Stretch of Sage Grown Desert.



Twenty Miles from Denver.

Bennett	24.8	173.1	31.8	Dog Springs.....	10.4	79.8	110.3
Watkins	9.5	182.6	32.3	Spring Valley...	7.1	56.9	103.2
Sable	12.3	194.9	10.0	Evanston	18.7	105.6	84.5
Denver	10.0	204.9	0.0	Wabatch, Utah..	10.2	115.8	74.3

Denver-Cheyenne, 100.2 Miles.

	Miles to	Total Miles	Out Return
Denver	0.0	0.0	100.2
Broomfield	16.5	16.5	83.7
Lafayette	6.0	22.5	77.7
Berthoud	11.9	34.4	65.8
Loveland	7.3	41.7	58.5
Fort Collins.....	13.0	54.7	45.5
Wellington	11.7	66.4	33.8
Cheyenne, Wyo.	33.8	100.2	0.0

Cheyenne-Rawlins, 195.5 Miles.

	Miles to	Total Miles	Out Return
Cheyenne	0.0	0.0	195.5
Borlie	9.5	9.5	186.0
Otto	5.0	14.5	181.0
Granite Canyon..	4.7	19.2	176.3
Buford	8.1	27.3	168.2
Laramie	31.3	58.6	136.9
Medicine Bow....	74.0	132.6	62.9
Carbon	9.4	142.0	53.5
Hanna	13.0	155.0	40.5
Fort Steele.....	25.6	180.6	14.9
Greenville	7.9	188.5	7.0
Rawlins	7.0	195.5	0.0

Rawlins-Green River, 157.5 Miles.

	Miles to	Total Miles	Out Return
Rawlins	0.0	0.0	157.5
Latham	30.0	30.0	127.5
Wamsutter	10.0	40.0	117.5
Red Desert.....	8.5	48.5	109.0
Tipton	8.0	56.5	101.0
Monell	12.0	68.5	89.0
Bitter Creek....	25.0	93.5	64.0
Black Buttes....	10.0	103.5	54.0
Mallville	6.0	109.5	48.0
Point of Rocks..	6.0	115.5	42.0
Rock Springs....	26.0	141.5	16.0
Green River	16.0	157.5	0.0

Green River-Salt Lake City, 190.1 Miles.

	Miles to	Total Miles	Out Return
Green River.....	0.0	0.0	190.1
Bryan	13.7	13.7	176.4
Granger	20.9	34.6	155.5
Liman	29.1	63.7	126.4
Fort Bridger ...	5.7	69.4	120.7

Kearney's Ranch-Ely, 125 Miles.

	Miles to	Total Miles	Out Return
Kearney's Ranch	0.0	0.0	125.0
Ibapah	36.5	36.5	88.5
Tippett, Nev.....	15.0	51.5	73.5
Shelbourne	18.5	70.0	55.0
Kent	30.0	100.0	25.0
McGill	12.3	112.3	12.7
Ely	12.7	125.0	0.0

Ely-Austin, 147 Miles.

	Miles to	Total Miles	Out Return
Ely	0.0	0.0	147.0
Lane City	2.5	2.5	144.5
Riepetown	8.0	10.5	136.5
Kimberly	1.0	11.5	135.5
Moorman's	21.0	32.5	114.5
Rosevear's	2.5	35.0	112.0
White Pine.....	6.0	41.0	106.0
Pancake	14.0	55.0	92.0
Eureka	22.0	77.0	70.0
Austin	70.0	147.0	0.0

Austin-Reno, 183.5 Miles.

	Miles to	Total Miles	Out Return
Austin	0.0	0.0	183.5
Alpine Ranch ..	47.5	47.5	136.0
Eastgate	12.5	60.0	123.5
Westgate	20.0	80.0	103.5
Sand Springs....	10.0	90.0	93.5
Fallon	27.0	117.0	66.5
Leetville	8.0	125.0	58.5
Hazen	8.5	133.5	50.0
Fernley	12.5	146.0	37.5
Wadsworth	3.5	149.5	34.0
Sparks	30.0	179.5	4.0
Reno	4.0	183.5	0.0

†Reno-Sacramento, 152.7 Miles.

	Miles to	Total Miles	Out Return
Reno	0.0	0.0	152.7
Lawton	6.5	6.5	146.2
Verdi	5.5	12.0	140.7
Truckee, Cal....	23.0	35.0	117.7



An Auto Road Through the Northern Rockies.



Shelbourne Pass, Near Tippett, Nev.

Emigrant Gap...	32.0	67.0	85.7	Lodi	3.0	36.8	99.8
Alta	12.0	79.0	73.7	Stockton	15.8	52.4	83.9
Gold Run	4.0	83.0	69.7	French Camp...	5.0	57.4	78.8
Magma	3.5	86.5	66.3	Banta	11.9	69.3	64.9
Colfax	7.5	94.0	58.7	Janney	7.0	76.3	59.9
Welmar	5.2	99.2	52.5	Alta Mont.....	11.6	87.9	48.3
Clipper Gap ...	6.7	105.9	46.8	Greenville	2.7	90.6	45.6
Auburn	6.0	111.9	46.3	Livermore	4.6	95.3	41.6
Folsom	19.0	130.9	21.8	Dublin	10.3	105.5	30.7
Sacramento	21.8	152.7	0.0	East Oakland...	22.1	127.6	8.0
				Oakland	3.1	130.7	5.5
				San Francisco...	5.5	136.2	0.0

Sacramento-San Francisco, 136.2 Miles.

		Total Miles
	Miles to	Out Return
Sacramento	0.0	0.0 136.2
Elk Grove	14.8	14.8 121.4
McConnell	3.1	17.9 118.3
Arno	2.3	20.1 116.1
Galt	6.2	26.3 109.9
Woodbridge	7.3	33.6 102.6

*Alternative.

Julesburg-Cheyenne, 145.2 Miles.

		<u>Total Miles</u>	
	Miles to	Out	Return
Julesburg	0.0	0.0	145.2
Chapell, Neb.....	15.0	15.0	130.2

Lodgepole	9.5	24.5	120.7
Sunol	14.0	38.5	106.7
Sidney	4.5	43.0	102.2
Brownson	8.0	51.0	94.2
Herdon	5.5	56.5	88.7
Potter	5.5	62.0	83.2
Jacinto	4.5	66.5	78.7
Dix	4.5	71.0	74.2
Owasco	4.5	75.5	69.7
Kimball	5.0	80.5	64.7
Oliver	6.7	87.2	58.0
Bushnell	5.5	92.7	52.5
Pine Bluff, Wyo.	10.0	102.7	42.5
Egbert	10.5	113.2	32.0
Burns	10.0	123.2	22.0
Archer	14.0	137.2	8.0
Cheyenne	8.0	145.2	0.0

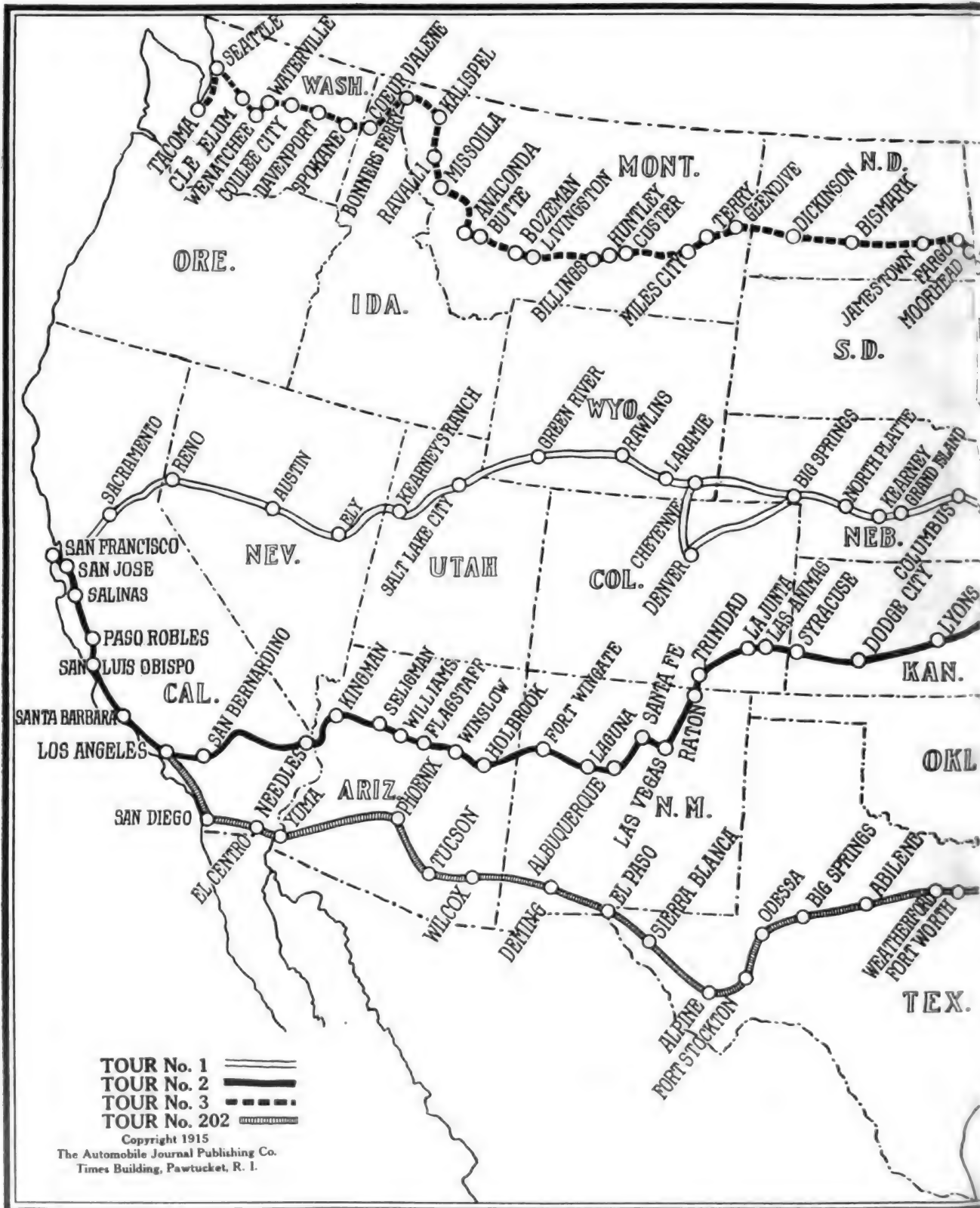
†Alternative.

Reno-Sacramento, 165.9 Miles.

		Total Miles	
	Miles to	Out	Return
Reno	0.0	0.0	165.9
Steamb't Springs	11.5	11.5	154.4
Carson City.....	20.5	32.0	133.9
Edgewood	26.0	58.0	107.9
Meyers, Cal.....	9.7	67.7	98.2
Phillips	3.5	71.2	94.7
Echo	7.2	78.4	87.5
Kyburn	10.0	88.4	77.5
Riverton	10.0	98.4	67.5
Pacific	4.5	102.9	63.0
Camino	8.0	110.9	55.0
Placerville	7.0	117.9	48.0
Eldora	7.5	125.4	40.5
Shingle Spring..	5.0	130.4	35.5
Clarksville	8.0	138.4	27.5
White Rock.....	2.0	140.4	25.5
Mills	13.5	153.9	12.0
Perkins	6.0	159.9	6.0
Sacramento	6.0	165.9	0.0



View of Donner Lake on the Emigrant Gap Route, West of Truckee, Cal., 7000 Feet Above Sea Level.



This Map Shows the Four Leading Transcontinental Routes Over Which Thousands of Tourists Will Go to the cago; the National Old Trails Road is Route Two from New York to Los Angeles and San Francisco via Wash with the Lincoln Highway and with Routes Given Elsewhere in This Book; Seattle is Connected with San York and Washington on Routes 108 and 107; the Pikes Peak Highway Connecting Routes No. One and Two



Pacific Coast This Summer. The Lincoln Highway Is Route One from New York to San Francisco, Touching Chicago and St. Louis; the National Parks Highway Is Route Three from Chicago to Seattle, Connecting at Chicago Francisco by the Pacific Highway Shown, Route 209. The Extreme Southern Route, No. 202, Is Reached from New from Kansas City to Salt Lake City, Is Route No. 201.

MAKE TOURING NOTES ON THIS PAGE

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo



The Wonders of the Southwest.

TRANSCONTINENTAL touring will be by long odds the most outstanding feature of the summer touring season of 1915. With Europe closed to pleasure seekers by the great war, it becomes virtually a necessity for motorists to "See America" first. The two great expositions on the Pacific coast are still an additional stimulation to long distance driving. And, furthermore, the recent great improvement in the transcontinental roads, the multiplication of hotels, garages and supply stations has now robbed the trip of most of the very real hardships that were a part of it only a few years ago.

It is perhaps safe to say that more people will cross the continent by motor car this summer than have crossed it that way since the motor car developed. Among those Americans who can afford the time and money required for the trip it will be the most popular of all trips this year.

The National Old Trails route takes a more southerly course than the Lincoln highway. Two million dollars were spent in its improvement in 1914 and a like amount will be spent in 1915.

There are passable hotels and good supply stations at every night stop on the entire trip.

The route starts from New York City and proceeds from the ferry landing at Weehawken southwestward to Camden, and thence across the Delaware river to Philadelphia. Here there are hundreds of points of interest, too well known and too numerous to mention. They include Independence hall, the Betsy Ross house, League Island navy yard, Fairmount park and the University of Pennsylvania.

The next leg of the trip runs from Philadelphia to Wilmington, through Havre de Grace to Baltimore, with its many points of great interest, and thence to Washington. Among the legion of things to be seen at the nation's capital are the Capitol, White house, Arlington National cemetery, the Botanical gardens, Corcoran Art galleries, Bureau of Fisheries, the Lincoln museum, Smithsonian institute and Zoological park.

Turning slightly toward the north and continuing westward, the road goes through Fredrick, Hagerstown, Hancock to Cum-

berland, Maryland. Here it takes up the course of the first of the "Old Trails," from which it has taken its name. This is the Old National pike, built by the federal government early in the 19th century. The first appropriations were made in 1806. It was intended to connect the capital city with St. Louis, Mo. It was, however, never completed, but only surveyed beyond Marshall, Ill. In 1836 the building of roads was turned over to the states, the federal government abandoning the project.

The section of Maryland through which the road goes on its way to Cumberland is rich in historic interest. Over this country George Washington worked as a young surveyor, and in colonial days it was a battle ground for the French, Indians and British. Fredrick, Maryland, 45 miles from Washington, is the town about which Whittier's "Barbara Fritchie," the famous Civil war poem, was written. It is the birthplace of the late Admiral Winfield Scott Schley and contains the grave of Francis Scott Key, author of the Star Spangled Banner.



At the End of the Route, the San Francisco Exposition.

Braddock Heights, a short distance beyond Fredrick, takes its name from General Braddock, who lost his life and 700 men in an attempt to reach Fort Duquesne during the French and Indian war. Cumberland is extremely familiar to one who has read much of the Civil war. It is in the heart of the Allegheny mountains. The tourist follows "The Narrows," as the gorge cut by the Potomac river is called, up through the hills, with striking mountain views constantly before his eyes.

The highest point reached in crossing the Alleghenies is at Keyser ridge, where an elevation of 2800 feet is reached. Near Strawn, Penn., the Pennsylvania state line is crossed to Sommerfield on the Youghiogheny river. On the site of the town Washington crossed the river with six companions on his way to carry a message from Governor Dinwiddie of Virginia to the French, and again at the head of an expedition he led against the French in 1754. General Braddock crossed here also only a short time before his death.

Northwestward, at Farmington, is the site of Fort Necessity, where Washington suffered defeat at the hands of the French and Indians, and thence goes the road through several villages to Uniontown, where there are many

coal mines. Out to the northwest from Uniontown the road leads to Brownsville, where the Monongahela river is crossed. Washington, Penn., is passed and the West Virginia state line is encountered at West Alexander. The next stop is Wheeling, the capital of the state. Here the Ohio river is crossed into Ohio. There is now an unbroken stretch of brick paving 16 feet wide through Zanesville to Columbus.

From Columbus to the Indiana state line, on the old National

road, there is much brick paving and before long every mile of it will be surfaced with brick. The route lies through Springfield, Dayton, Eaton and Richmond to Indianapolis. From Indianapolis the road runs slightly south of west to Terre Haute, famous for its distilleries and the centre of a rich agricultural and coal mining district. West of Terre Haute, Marshall, Ill., the end of the actually constructed section of the old National road, is quickly reached, and from there on to St. Louis rough dirt roads, about the worst of the trip are encountered.

Out of St. Louis, at Warrenton, the Mineola hills have been surmounted by fine modern roads and no longer offer the impediment to tourists that was once the greatest on the National Old Trails road. The next point of interest is Fulton, Mo., seat of three colleges, a school for the deaf and the state hospital. Westward from Fulton the roads are excellent and the country one of the most prosperous and well developed agricultural sections of the United States. The route taken through this part of Missouri is that of the Boone Lick trail, which took its name from Daniel Boone, the famous frontiersman. At Rocheport the road touches the Missouri river, which is later crossed on a ferry from Old Franklin to Booneville.

At Booneville the third of the old trails, the Sante Fe, begins and continues through Kansas



Crossing the Blue Ridge Mountains in Pennsylvania.



Old Spanish Governor's Palace, Santa Fe.

City, across Kansas and a corner of Colorado, through New Mexico to Santa Fe. In the days of the "Forty-niners" this road carried thousands of pioneers travelling by wagon to their new homes and wheel ruts still visible in places show the volume of that traffic. Booneville was settled in 1810 and in the days of the wagon traffic was one of the greatest wholesale distributing points in the southwest. Among its business enterprises is the largest corn cob pipe factory in the world.

West from Booneville to Arrow Rock are very fine dirt roads. Arrow Rock became a city in 1829. The medicine chest of Dr. John Sappington, a pioneer physician, is still kept in the Old Tavern, one of the most ancient buildings in the state. It is said that he sent his son east to buy 200 ounces of quinine, a very necessary, but scarce drug in those days, and the young man, misunderstanding, bought 200 pounds. The proceeds from the sale of the drug made the father independently rich. Through Marshall, Mo., a thriving agricultural centre, the road leads to Kansas City,

Over excellent roads, through the wonderful Kansas wheat fields, the route goes west across the state. They were wild times along this road in 49 when hostile Indians massacred white settlers on their way westward, and again during the Civil war, when anti-slavery Kansas was frequently embroiled with pro-slav-

ery Missouri. Council Grove, 138 miles from Kansas City, takes its name from the fact that here, in council with six chiefs of the Osage Indians, representatives of the United States government arranged a treaty which provided that settlers travelling westward over Santa Fe trail should not be molested by the red men. A monument in the town is capped by an old bell used to call the settlers together when an Indian attack threatened. Dodge City, once a tough town in the wildest days of the West, where Bat Masterson, "Wild Bill" Hickock, Wyatt Earp and other notorious gun fighters had their encounters, is now a peaceful and prosperous town.

Garden City is interesting in that electric pumping plants there supply water for the irrigation of 40,000 acres of surrounding land. The Colorado line is crossed between Coolidge, Kan., and Holly, Col. At Las Animas is still standing the old cabin in which Kit Carson lived. The name Las Animas is said to signify "Souls in Purgatory," having taken its name from the fact that a party of Spaniards seeking a way from the southwest to Florida, lost their lives in the valley of Las Animas river. The town is on an elevation of 3885 feet. A fort near the town is said to stand on the spot from which Colonel Pike, in 1806, got his first view of Pike's peak. The route crosses the Arkansas river at La Junta and shortly crosses the New Mexico line to Raton, to which it goes down through the Raton pass. Notwithstanding the drop, the altitude here is 6600 feet. The Berlea and Johnson Mesas, near Raton, are curious rock shaped projections on the face of the plain, which are covered with fine agricultural land about 50,000 acres in extent, on which 2000 prosperous farmers live.

From Raton the road continues through a thriving cattle country, where there are many gates for the motorist to open and close so that cattle may not escape their ranges. Even at its lowest point the road here is a mile above sea level. The air is extremely dry and decay is so slow that the signs of an ancient civilization are visi-



The Famous La Badja Hill Near Santa Fe.

ble in many places. Wagon Mound takes its name from a hill which has the shape of a prairie schooner. It is the first real Mexican town encountered by the westbound traveller. Las Vegas also has an interesting Mexican quarter in old Las Vegas, across the Gallinas river.

The southwestern terminus of the Sante Fe trail is the city of Sante Fe, Mexican in its spirit and history and wonderfully rich in interest. It was founded in 1605 by the Spaniards and at that time was given the name "La Ciudad Real de la Santa Fe de San Francisco," meaning, "The True City of the Holy Faith of St. Francis." Before the Spaniards came it had been the centre of a civilization so

vowed to build a chapel if his arms were successful. The oldest house in the United States, built about 1530, is another land mark of Santa Fe, as is the Old Exchange hotel, where travellers over the trail put up in the early days. The town is 7000 feet above the sea level and it probably has more sunshiny days every year than any other city in the United States. The water supply is drawn from a lake 12,000 feet above the sea level.

La Badja hill, out of Sante Fe to the westward, is a climb that every motorist will remember, not so much from its difficulty, as from the fine views obtainable from its summit, and the evidence of great labor expended to pro-

phants. It took 40 years to carry up the graveyard.

Near Guam, N. M., the tourist comes into view of Pyramid rock and Navjo church. At Fort Wingate the Mexican soldiers, who entered the United States by crossing the Rio Grande during the Carranza revolution against Huerta, were quartered. They have done much labor on the roads thereabout and have greatly improved them.

Through this country the road follows the fourth and last of the ancient trails from which the route takes its name, the Old Padres trail, over which the priests travelled in their efforts to carry the gospel to the Indians.

West of St. Michaels, Arizona, the tourist approaches the petrified forest. Petrified trees of gigantic size, many of them very long, but broken into curious shaped splinters, lie scattered about in great confusion. They retain all the fine grained markings of the original wood, but have been changed to stone, agate, amethyst, cornelian and chalcodony. They sparkle and gleam like jewels in the sunshine. There are three of these forests, with thousands of trees, and all are guarded jealously by the federal government and visitors are not allowed to carry away souvenirs.

Close to the road, 20 miles west of Winslow, Arizona, is Meteor crater, a great hole in the desert, three miles in circumference and 600 feet deep. This was made by the falling of a gigantic meteor, splinters of which are to be found all about the spot, and 1100 feet beneath the surface the main body of the meteor still lies.

Flagstaff, Arizona, 7000 feet high, is in the centre of a great national forest reserve, the largest pine forest remaining in the United States. It is at the foot of the San Francisco peaks. From Flagstaff a side trip of 69 miles each way over a good road leads to the Grand Canon of the Colorado.

Crossing the Colorado river, at Topcock, on the Sante Fe railroad bridge, which has been planked to allow the passage of motor cars, the tourist arrives shortly at Needles, Cal., which is on the eastern side of the great Mojave desert. Needles is the northern terminus of boat traffic down the



On the Old Trails Road in Pennsylvania.

ancient that little is known about it. In the old palace, still in use by the city, lived 76 successive Mexican and Spanish governors, as well as 19 American territorial governors. In the building is now established an archaeological school, which is doing extensive research work among the ancient cliff dwellings of the vicinity. There, too, General Lew Wallace completed his work on "Ben Hur." A marvelous collection of antique relics of the ancient American civilization is shown in the palace. The chapel Rosario on a hill above the town was built in fulfillment of a pledge made in prayer by Diego de Vargas, a Spanish commander, who, in 1692, drew up 200 men there to attack the town. He offered a prayer in which he

vide "good roads." Albuquerque is extremely interesting because of its Indian and Mexican life—a fine type of the Mexican city.

Puebla Laguna is a settlement of Puebla Indians whose ancestors have lived in the same spot in the same way for many centuries. These Indians are pagans, clinging persistently to the religion and customs of their forefathers. They are peaceful and industrious. Acoma is perched on a precipitous rock 300 feet above the face of the plain and 7000 feet above the sea level. The only entrance to the town was formerly a staircase, cut in the face of the rock. All the dirt used in building, as well as that which covers the graveyard, was once carried up the steps on the backs of the inhabi-



A Winding Mountain Road Near San Diego.

river to the Gulf of California.

Across the Mojave desert, once a great graveyard for travellers and their animals, a fine modern road, costing \$10,000 to \$15,000 a mile has been built. It is kept oiled most of the way and alkali dust is scarce on the run of 165 miles, which can be made at better than 20 miles an hour by almost any car. There are stations, too, where car supplies and food may be purchased. From Barstow, on the western side of the desert, it is a run of 78 miles to San Bernadino. A few miles out the arid region begins to change to one of great fertility—the typical California agricultural district is reached at San Bernadino. From here on the famous California roads through the famous California country make the trip delightful. The El Camino Real, from San Diego to the north, connected the old Spanish missions, rare specimens of a distinctive architecture, with each other. Los Angeles is 68 miles from San Bernadino and from there are the best roads to San Francisco, and all other points in the state.

The California state road along the coast from Los Angeles to San Francisco is as good as any road to be found in the United States. On test runs automobiles have covered the distance at more than 40 miles per hour, beating the fastest express trains on the railroad. It goes through some of the finest cultivated districts of California and every foot of it is exceptionally interesting.

All California roads, in fact, are good, and they are rapidly getting better. One of the leading businesses of the state is entertaining tourists, and this with the

progressive spirit that prevails there has made it easy to get the best of support for the good roads movement. Only the State of New York has more automobiles registered than California.

ITINERARY NO. 2.

Night Stops—New York City, Philadelphia, Washington, D. C.; Cumberland, Md.; Wheeling, W. Va.; Columbus, O.; Indianapolis, Terre Haute, Ind.; St. Louis, Columbia, Mo.; Kansas City, Emporia, Hutchinson, Dodge City, Syracuse, Kan.; La Junta, Trinidad, Col.; Las Vegas, Santa Fe, Albuquerque, McCarty's, Gallup, N. M.; Holbrook, Flagstaff, Kingman, Ariz.; Amboy, San Bernadino, Los An-

geles, Santa Barbara, Pasa Robles, Santa Cruz, San Francisco, Cal. Thirty-one Days, 3726 Miles.

New York-Philadelphia, 95.6 Miles.

	Miles to		Total Miles
	Out	Return	
New York	0.0	0.0	95.6
Weehauken Ferry	1.6	1.6	94.0
Weehauken	1.6	1.6	94.0
Jersey City	4.7	6.3	89.3
Newark	5.9	12.2	83.4
Elizabeth	5.8	18.0	77.6
Rahway	5.1	23.1	72.5
Iselin Station	4.3	27.4	68.2
Metuchen	4.0	31.4	64.2
New Brunswick	4.6	36.0	59.6
Monmouth Jet.	10.8	46.8	48.8
Trenton	16.6	63.4	32.2
Fallsington, Penn.	3.6	67.0	28.6
Oxford Valley	3.0	70.0	25.6
Hulmeville	3.6	73.6	22.0
Andalusia	5.3	78.9	16.7
Red Lion Inn	1.5	80.4	15.2
Torresdale	0.7	81.1	14.5
Holmesburg	2.3	83.4	12.2
Philadelphia	12.2	95.6	0.0

Philadelphia-Washington, 139.4 Miles.

	Miles to		Total Miles
	Out	Return	
Philadelphia	0.0	0.0	139.4
Darby	6.3	6.3	133.1
Glenolden	1.9	8.2	131.2
Norwood	1.1	9.3	130.1
Eddystone	3.2	12.5	126.9
Chester	1.1	13.6	125.8
Marcus Hook	4.9	18.5	120.9
Claymont, Del.	1.6	20.1	119.3
Holly Oak	1.1	21.2	118.2
Wilmington	5.2	26.4	113.0
Elsmere Jet.	3.1	29.5	109.9
Price's Corner	1.7	31.2	108.2
Marshalltown	0.8	32.0	107.4
Newark	8.0	40.0	99.4
Elkton, Md.	6.6	46.6	92.8
North East	6.0	52.6	86.8
Perryville	8.3	60.9	78.5
Havre de Grace	0.9	61.8	77.6
Webster	4.2	66.0	73.4
Churchville	4.5	70.5	68.9



One of the Wide New California Highways.



Road Building on the Pacific Coast.

Belair	5.8	76.3	63.1
Kingsville	7.2	83.5	55.9
Carney	6.2	89.7	49.7
Baltimore	10.7	100.4	39.0
Elkridge	9.0	109.4	30.0
Laurel	12.0	121.4	18.0
Contee	2.0	123.4	16.0
Beltsville	3.5	126.9	12.5
Hyattsville	6.5	133.4	6.0
Bladensburg	0.5	133.9	5.5
Washington	5.5	139.4	0.0

Washington-Cumberland, 139.7
Miles.

	Miles to	Total Miles	Out Return
Washington	0.0	0.0	139.7
Bethesda	7.4	7.4	132.3
Rockville	7.9	15.3	124.4
Galtherburg	5.2	20.5	119.2
Clarksburg	8.0	28.5	111.2
Hyattstown	3.9	32.4	107.3
Fredrick	11.3	43.7	96.0
Braddock Heights	3.0	46.7	93.0
Middletown	5.0	51.7	88.0
Boonsboro	8.0	59.7	80.0
Benevola	3.0	62.7	77.0
Hagerstown	8.0	70.7	69.0
Clear Springs	12.0	82.7	57.0
Indian Springs	4.0	86.7	53.0
Hancock	11.0	97.7	42.0
Bellegrove	13.0	110.7	29.0
Piney Grove	4.0	114.7	25.0
Pratt	8.0	122.7	17.0
Glipen	3.0	125.7	14.0
Flintstone	1.0	126.7	13.0
Cumberland	13.0	139.7	0.0

Cumberland-Wheeling, 132
Miles.

	Miles to	Total Miles	Out Return
Cumberland	0.0	0.0	132.0
Elkhart Mines	9.0	9.0	123.0
Frostburg	2.0	11.0	121.0
Grantville	14.0	25.0	107.0
Keyser Ridge	6.0	31.0	101.0
Addison	5.0	36.0	96.0
Somerfield	4.0	40.0	92.0
Farmington	10.0	50.0	82.0
Fort Necessity	1.5	51.5	80.5
Chalk Hill House	3.0	54.5	77.5
Summitt	1.5	56.9	76.0
Uniontown	6.0	62.0	70.0
Brownsville	12.0	74.0	58.0
Scenery Hill	12.0	86.0	46.0
Washington	13.0	99.0	33.0
Claysville	10.0	109.0	23.0

West Alexander, W. Va.	7.0	116.0	16.0
Wheeling	16.0	132.0	0.0

Wheeling-Columbus, 128.1
Miles.

	Miles to	Total Miles	Out Return
Wheeling	0.0	0.0	128.1
Bridgeport	1.2	1.2	126.9
St. Clairsville	9.7	10.9	117.2
Lloydsville	5.2	16.1	112.0
Morristown	3.8	19.9	108.2
Hendricksburg	5.7	25.6	102.5
Fairview	3.4	29.0	99.1
Washington	11.6	40.6	87.5
Cambridge	8.4	49.0	79.1
New Concord	8.3	57.3	70.8
Norwich	3.2	60.5	67.6
Zanesville	11.9	72.4	55.7
Sterling	8.1	80.5	47.6
Brownsville	5.8	86.3	41.8
Linnville	4.7	91.0	37.1
Jacktown	4.0	95.0	33.1
Hebron	4.0	99.0	29.1
Kirksville	6.0	105.0	23.1
Etna	6.6	111.6	16.5
Reynoldsville	4.4	116.0	12.1
Columbus	12.1	128.1	0.0

Columbus-Indianapolis, 176.4
Miles.

	Miles to	Total Miles	Out Return
Columbus	0.0	0.0	176.4
Alton	9.4	9.4	167.0
W. Jefferson	5.0	14.4	162.0
Lafayette	7.4	21.8	154.6
Summerford	4.7	26.5	149.9
Brighton	3.8	30.3	146.1
Vienna	2.6	32.9	143.5
Harmony	4.6	37.5	138.9
Springfield	5.9	43.4	133.0
Enon	7.8	51.2	125.2
Fairfield	6.2	57.4	119.0
Harshman	6.3	63.7	112.7
Dayton	4.1	67.8	108.6
Kingaville	4.8	72.6	103.8
New Lebanon	5.7	78.3	98.1
Johnsville	1.9	80.2	96.2
W. Alexandria	6.0	86.2	90.2
Eaton, O.	5.5	91.7	84.7
Richmond, Ind.	15.9	107.6	68.8
Centerville	6.1	113.7	62.7
Cambridge City	9.3	123.0	53.3
Lewisville	9.8	132.8	43.6
Knightstown	9.4	142.2	34.2
Greenfield	13.0	155.2	21.2
Indianapolis	21.2	176.4	0.0

Indianapolis-Terre Haute, 70.4
Miles.

	Miles to	Total Miles	Out Return
Indianapolis	0.0	0.0	70.4
Bridgeport	9.0	9.0	61.4
Plainfield	4.8	13.8	56.6
Belleville	4.9	18.7	51.7
Stilesville	8.2	26.9	43.5
Mt. Meridan	7.0	33.9	36.5
Coatsville	6.1	40.0	30.4
Reelsville	5.9	45.9	24.5
Harmony	5.9	51.8	18.6
Brasil	3.1	54.9	15.5
Seeleyville	7.6	62.5	7.9
Terre Haute	7.9	70.4	0.0

Terre Haute-St. Louis, 172
Miles.

	Miles to	Total Miles	Out Return
Terre Haute	0.0	0.0	172.0
Marshall, Ill.	16.8	16.8	155.2
Martinsville	10.8	27.6	144.4
Casey	6.3	33.9	138.1



The Oldest House in the United States, Sante Fe.

Greenup	9.8	43.7	128.3
Teutopolis	18.4	62.1	109.9
Edingham	3.9	66.0	106.0
Altamont	14.4	80.4	91.6
Vandalia	19.8	100.2	71.8
Hagerstown	4.3	104.5	67.5
Mulberry	6.8	111.3	60.7
Greenville	8.7	120.0	52.0
Pocahontas	10.0	130.0	42.0
Highland	9.0	139.0	33.0
Collinsville	21.0	160.0	12.0
St. Louis, Mo.	12.0	172.0	0.0

St. Louis-Columbia, 140.7
Miles.

		Total Miles	
		Miles to	Out Return
St. Louis	0.0	0.0	140.7
Wellston	6.4	6.4	134.3
Pattonville	8.0	14.4	126.3
St. Charles	5.4	19.8	120.9
Cottleville	11.0	30.8	109.9
Wentzville	14.3	45.1	95.6
Foristell	7.0	52.1	88.6
Wright City	4.5	56.6	84.1
Warrenton	9.3	65.9	74.8
Jonesburg	9.8	75.7	65.0
Danville	13.0	88.7	52.0
Mincola	2.7	91.4	49.3
Calwood	17.7	109.1	31.6
Fulton	7.9	117.0	23.7
Millersburg	11.1	128.1	12.6
Columbia	12.6	140.7	0.0

Columbia-Kansas City, 159.2
Miles.

		Total Miles	
		Miles to	Out Return
Columbia	0.0	0.0	159.2
Rocheport	14.4	14.4	144.8
New Franklin	15.7	30.1	129.1
Booneville	3.0	33.1	126.1
Arrow Rock	20.5	53.6	105.6
Marshall	16.9	70.5	88.7
Waverly	21.8	92.3	66.9
Dover	11.2	103.5	55.7
Lexington	11.0	114.5	44.7
Wellington	7.3	121.8	37.4
Levasy	10.5	132.3	26.9
Independence	17.9	150.2	9.0
Centropolis	4.2	154.4	4.8
Kansas City	4.8	159.2	0.0

Kansas City-Emporia, 134.1
Miles.

		Total Miles	
		Miles to	Out Return
Kansas City	0.0	0.0	134.1
Martin City	16.4	16.4	117.7
Olathe	12.4	28.8	105.3
Edgerton	17.9	46.7	87.4
Ottawa	24.5	71.2	62.9
Williamsburg	17.2	88.4	45.7
Waverly	13.1	101.5	32.6
Emporia	32.6	134.1	0.0

Emporia-Hutchinson, 122.3
Miles.

		Total Miles	
		Miles to	Out Return
Emporia	0.0	0.0	122.3
Cottonwood			
Falls	21.8	21.8	100.5
Elmdale	6.2	28.0	94.3
Clements	7.7	35.7	86.6
Florence	13.1	48.8	73.5
Peabody	14.9	63.7	58.6
Halstead	31.5	95.2	27.1
Hutchinson	27.1	122.3	0.0

Hutchinson-Dodge City, 154.8
Miles.

		Total Miles	
		Miles to	Out Return
Hutchinson	0.0	0.0	154.8
Sterling	24.9	24.9	129.9
Lyons	9.5	34.4	120.4

Chase	9.7	44.1	110.7
Ellinwood	13.5	57.6	97.2
Great Bend	10.4	68.0	86.8
Kinsley	47.7	115.7	39.1
Spearville	22.0	137.7	17.1
Dodge City	17.1	154.8	0.0

Dodge City-Syracuse, 107.4
Miles.

		Total Miles	
		Miles to	Out Return
Dodge City	0.0	0.0	107.4
Colmaron	19.2	19.2	88.2
Ingalls	7.0	26.2	81.2
Garden City	26.8	53.0	54.4
Lakin	25.1	78.1	29.3
Kendall	16.9	95.0	12.5
Syracuse	12.4	107.4	0.0

Syracuse-La Junta, 115.5 Miles.

		Total Miles	
		Miles to	Out Return
Syracuse	0.0	0.0	115.5
Holly	22.0	22.0	93.5
Granada	17.7	39.7	75.8
Lamar	17.6	57.3	58.2
Prowers	8.1	65.4	50.1
Las Animas	28.3	93.7	21.8
La Junta	21.8	115.5	0.0

Pajarita	22.3	40.5	34.7
Rowe	2.3	42.8	32.4
Pecos	6.7	49.5	25.7
Glorieta	6.1	55.6	19.6
Canoncito	4.4	60.0	4.4
Sante Fe	15.2	75.2	0.0

Sante Fe-Albuquerque, 66.7
Miles.

		Total Miles	
		Miles to	Out Return
Sante Fe	0.0	0.0	66.7
Domingo	26.9	26.9	39.8
Algodones	14.3	41.2	25.5
Sandia	11.3	52.5	14.2
Alameda	6.2	58.7	8.0
Albuquerque	8.0	66.7	0.0

Albuquerque-McCarty's, 82.2
Miles.

		Total Miles	
		Miles to	Out Return
Albuquerque	0.0	0.0	82.2
Atrisco	3.3	3.3	78.9
Laguna	45.0	48.3	33.9



California State Road Cut on a Granite Shelf in the Lake Tahoe Country.

La Junta-Trinidad, 91.3 Miles.

		Total Miles	
		Miles to	Out Return
La Junta	0.0	0.0	91.3
Timpas	23.3	23.3	68.0
Thatcher	31.5	54.8	36.5
Kadrew	21.4	76.2	15.1
El Mora	11.4	87.6	3.7
Trinidad	3.7	91.3	0.0

Trinidad-Las Vegas, 141 Miles.

		Total Miles	
		Miles to	Out Return
Trinidad	0.0	0.0	141.0
Raton, N. M.	25.4	25.4	115.6
Maxwell	28.7	54.1	86.9
French	4.8	58.9	82.1
Springer	10.8	69.7	71.3
Wagon Mound	27.9	97.6	43.4
Watrous	22.9	120.5	20.5
Las Vegas	20.5	141.0	0.0

Vas Vegas-Santa Fe, 75.2
Miles.

		Total Miles	
		Miles to	Out Return
Las Vegas	0.0	0.0	75.2
Tecolote	12.0	12.0	63.2
Bernal	6.2	18.2	57.0

Casa Blanca..... 6.8 55.1 27.1
McCarty's..... 27.1 82.2 0.0
McCarty's-Gallup, 76 Miles.

		Total Miles	
		Miles to	Out Return
McCarty's	0.0	0.0	76.0
Grant's	13.0	13.0	63.0
Toltec	4.0	17.0	59.0
Bluewater	8.0	25.0	51.0
Baca	8.0	33.0	43.0
Chaves	7.0	40.0	36.0
Thoreau	3.0	43.0	33.0
Gonzales	7.0	50.0	26.0
Guam	4.0	54.0	22.0
Pera	4.0	58.0	18.0
Wingate	6.0	64.0	12.0
Gallup	12.0	76.0	0.0

Gallup-Holbrook, 124 Miles.

		Total Miles	
		Miles to	Out Return
Gallup	0.0	0.0	124.0
St. Michael's			
Arlk.	26.0	26.0	98.0
Wide Ruins	30.0	56.0	68.0
Navajo	25.0	81.0	43.0
Pinto	7.0	88.0	36.0
Petrified Forest	14.0	102.0	22.0
Carrizillo	9.0	111.0	13.0
Holbrook	13.0	124.0	0.0

Holbrook-Flagstaff, 117 Miles.

	Miles to	Total Miles	Out Return
Holbrook	0.0	0.0	117.0
Winslow	36.0	36.0	81.0
Leupp	28.6	64.6	52.4
Tolchaco	10.8	75.4	41.6
Flagstaff	41.6	117.0	0.0

Flagstaff-Kingman, 174 Miles.

	Miles to	Total Miles	Out Return
Flagstaff	0.0	0.0	174.0
Riorden	7.0	7.0	167.0
Bellemont	5.0	12.0	162.0
Maine	8.0	20.0	154.0
Chalender	4.0	24.0	150.0
Williams	12.0	36.0	138.0
McClellan	8.0	44.0	130.0
Ash Fork	12.0	56.0	118.0
Pineveta Station	8.0	64.0	110.0
Crookton	5.0	69.0	105.0
Seligman	12.0	81.0	93.0
Chino	4.0	85.0	89.0

Fenner	9.0	111.0	43.0
Danby	16.0	127.0	27.0
Cadiz	13.0	140.0	14.0
Amboy	14.0	154.0	0.0

Amboy-San Bernadino, 160 Miles.

	Miles to	Total Miles	Out Return
Amboy	0.0	0.0	160.0
Bagdad	7.0	7.0	153.0
Ash Hill	14.0	21.0	139.0
Ludlow	7.0	28.0	132.0
Lavic	9.0	37.0	123.0
Flagah	5.0	42.0	118.0
Hector	5.0	47.0	113.0
Newberry	14.0	61.0	99.0
Mineola	6.0	67.0	93.0
Daggett	6.0	73.0	87.0
Baratow	9.0	82.0	78.0
Todd	6.0	88.0	72.0
Hicks	6.0	94.0	66.0
Hellen	9.0	103.0	57.0
Oro Grade	10.0	113.0	47.0

Los Angeles-Santa Barbara, 105.8 Miles.

	Miles to	Total Miles	Out Return
Los Angeles	0.0	0.0	105.8
Hollywood	7.7	7.7	98.1
Calabasas	21.0	28.7	77.1
Newberry Park	16.3	45.0	60.8
Camarillo	9.9	54.9	50.9
El Rio	8.1	63.0	42.8
Ventura	8.4	71.4	34.4
Carpenteria	22.5	93.9	11.9
Santa Barbara	11.9	105.8	0.0

Santa Barbara-Pasa Robles, 150.6 Miles.

	Miles to	Total Miles	Out Return
Santa Barbara	0.0	0.0	150.6
Goleta	6.8	6.8	143.8
Los Cruces	30.0	36.8	113.8
Los Olivos	16.7	53.5	97.1
Sisquoc	21.7	75.2	75.4
Garly	1.5	76.7	73.9
Santa Maria	11.7	88.4	62.2
Arroyo Grande	16.1	104.5	46.1
Edna	8.9	113.4	37.2
San Luis Obispo	6.2	119.6	31.0
Santa Mar-			
garita	11.0	130.6	20.0
Templeton	14.3	144.9	5.7
Pasa Robles	5.7	150.6	0.0

Pasa Robles-Santa Cruz, 149 Miles.

	Miles to	Total Miles	Out Return
Pasa Robles	0.0	0.0	149.0
San Miguel	9.1	9.1	139.9
Bradley	10.9	20.0	129.0
Jolon	25.7	45.7	103.3
Greenfield	29.3	75.0	74.0
Soledad	8.5	83.5	65.5
Gonzales	8.6	92.1	56.9
Salinas	16.8	108.9	40.1
Castroville	8.7	117.6	31.4
Watsonville	12.4	130.0	19.0
Aptos	11.3	141.3	7.7
Soquel	3.6	144.9	4.1
Santa Cruz	4.1	149.0	0.0

Santa Cruz-San Francisco, 90.9 Miles.

	Miles to	Total Miles	Out Return
Santa Cruz	0.0	0.0	90.9
Soquel	4.1	4.1	86.8
Los Gatos	21.6	25.7	65.2
San Jose	11.2	36.9	54.0
Santa Clara	3.9	40.8	50.1
Redwood City	20.5	61.3	29.6
San Mateo	6.6	67.9	23.0
S. San Francisco	10.0	77.9	13.0
San Francisco	13.0	90.9	0.0

**Where Rugged Sierra Nevadas Present Awe Inspiring Mountain Views.**

Audley	7.0	92.0	82.0
Pica	9.0	101.0	73.0
Yampai	5.0	106.0	68.0
Field's Station	2.0	108.0	66.0
Peach Springs	12.0	120.0	54.0
Cherokee	6.0	126.0	48.0
Truxton	6.0	132.0	42.0
Valentine	7.0	139.0	35.0
Hackberry	5.0	144.0	30.0
Antares	7.0	151.0	23.0
Hualpai	7.0	158.0	16.0
Louise	14.0	172.0	2.0
Kingman	2.0	174.0	0.0

Kingman-Amboy, 154 Miles.

	Miles to	Total Miles	Out Return
Kingman	0.0	0.0	154.0
McConico	4.0	4.0	150.0
Yucca	21.0	25.0	129.0
Topcock	30.0	55.0	99.0
Needles	16.0	71.0	83.0
Kilnefelter	12.0	83.0	71.0
Bannock	6.0	89.0	65.0
Homer	5.0	94.0	60.0
Goff's	8.0	102.0	52.0

Victorville	6.0	119.0	41.0
Hesperia	8.0	127.0	33.0
Cajon	13.0	140.0	20.0
Cozy Dell Store	2.0	142.0	18.0
Devore Store	7.0	149.0	11.0
Vermont	2.0	151.0	9.0
San Bernadino	9.0	160.0	0.0

San Bernadino-Los Angeles, 89.9 Miles.

	Miles to	Total Miles	Out Return
San Bernadino	0.0	0.0	89.9
Riverside	10.9	10.9	79.0
Bloomington	7.8	18.7	71.2
Etiwanda	12.2	30.9	59.0
N. Cuckamonga	4.0	34.9	55.0
Upland	3.6	38.5	51.4
Ontario	2.8	41.3	48.6
Pomona	5.5	46.8	43.1
Lemon	8.0	54.8	35.1
San Marino	17.9	72.7	17.2
Le Senda	2.0	74.7	15.2
Pasadena	4.4	79.1	10.8
Los Angeles	10.8	89.9	0.0

Side Trip from Flagstaff, Ariz. Flagstaff to Grand Canon, 87 Miles.

	Miles to	Total Miles	Out Return
Flagstaff	0.0	0.0	87.0
Beasley's Tanks	37.1	37.1	49.9
Schultz's Pass	4.4	41.5	45.5
Big Jim Canon	3.7	45.2	41.8
Locket Lake	24.0	69.2	17.8
Grand View	4.2	73.4	13.6
Long Jim Canon	3.5	76.9	10.1
Grand Canon	10.1	87.0	0.0

The NATIONAL PARKS HIGHWAY TRANSCONTINENTAL TOUR



Across the Mountainous Northwest.

THE National Parks highway, a new route from Chicago to Seattle, has recently been greatly improved at an expenditure of millions of dollars and now enables the tourist to visit three great national parks—the Yellowstone, Glacier and Mt. Ranier.

Since transcontinental motor traffic promised to develop in volume, the people of the northwest have been very anxious that the roads leading through their section should be developed to the point where they would attract motor traffic. For the past three

years commercial and public organizations have devoted great energy to road improvement.

The route of the National Parks highway was chosen three years ago, but has not been complete in all sections until this year. It was formally opened to motor traffic on June 15 and will be open to motorists without difficulty until Oct. 1.

In 1913 and 1914 \$1,500,000 was spent in improving that portion of the road that runs through Minnesota, the Dakotas and Montana. Idaho has devoted large

sums to this highway, constructing much of it with rubble, which is produced as a by product at the many mines in the state. Spokane county has spent \$300,000, and in western Washington \$1,000,000 has been expended.

This route can be utilized by eastern tourists who follow the Lincoln highway as far as Chicago, or by those from New England and the northwest who go from Boston to Albany, to Buffalo, to Cleveland, and across Indiana to Chicago.

Having arrived at the coast at

Seattle a good road is available southward through Portland and along the Pacific Coast to California and the expositions.

In the mountainous west there is hunting and fishing available on every side of the route. Water is plenty, so that it is unnecessary to carry a supply. Towns are frequent and numerous service stations make it possible for the motorist to cover the route in comfort. The Rockies are crossed on a gradual rise, the road reaching at one point an elevation of 7000 feet.

From Chicago the first day's

lakes, where fish abound.

Out of Milwaukee to Madison the route lies through a farming country of great prosperity and passes many of the famous southern Wisconsin lakes. For a time it runs along the shore of Pewaukee lake. The town of Oconomowoc is almost completely surrounded by lakes and from here many attractive local trips are possible.

Rocky country with many curious formations is traversed on the road from Madison to La Crosse. The roads in general are good, although near Elroy there is a long

for 100 feet. For some distance the road goes along St. Joseph's ridge, from the top of which, as the tourist nears La Crosse, a magnificent view of the Mississippi valley is obtainable.

If one prefers rough hills, but fine scenery to a better road, some very fine views of the Mississippi may be had on the route from La Crosse to St. Paul. The more direct route goes through Winona, an important grain shipping point, and Rochester, which is famous all over the world as the seat of St. Mary's Surgical hospital, where two famous physi-



A River Bottom Among the Mountains Near Livingston, Mont.

run goes north through Milwaukee to Madison. The early part of the route lies through a thickly settled suburban district. Evanston, the first town, has some of the finest residences in the United States. Northwestern university is located here. At Highland park is Northwestern Military academy, and Fort Sheridan, one of the largest military posts in the United States is passed. A little further north is the naval training school. Kenosha and Racine are well known manufacturing cities. This entire district in southern Wisconsin is dotted with many small and very attractive

stretch of sand. This will present no difficulties, however, to a good car.

Baraboo is the winter quarters of Ringling Brothers' circus and is the permanent home of its owners. There are many Indian mounds of great age in the vicinity. Devil's lake, about which there are many very curious rock formations, is easily reached from Baraboo. This lake is noted for its attractions. The famous "Dells of Wisconsin" are only a short distance north of Baraboo, at Kilbourne.

Out of Ablemans the rocks on each side of the road rise sheer

cians, the Mayo brothers, treat every year 15,000 patients, who come to them from all parts of the world.

St. Paul and Minneapolis are known everywhere as the Twin cities. They are 10 miles apart and have been so nearly equal in size that the term "twin" has been deemed appropriate. St. Paul is the older and is the capital of the state, but Minneapolis of late years has become considerably the larger.

St. Paul is located on the Mississippi river, at the head of navigation. The first settler built his house here in 1838. In 1841 a

chapel was dedicated to St. Paul by a French priest and from this chapel the place took its name. A new state capitol has recently been erected at a cost of \$4,500,000, and it contains some of the finest modern mural art. The Summitt avenue residence district, situated on a high bluff above the city, is the home of J. J. Hill, the great railroad builder.

Near St. Paul is Fort Snelling. Lake Como and Como park are only three miles from the city and the beautiful falls of Minnehaha, which in the Indian tongue, signified "Laughing Water," are accessible from either city. There are a great many fine lakes through this section of Minnesota. Those most accessible from the Twin Cities and most popular with summer visitors are White Bear lake, Minnetonka and Bald Eagle.

West from the Twin Cities the route lies through the rich farming and dairying country of southern Minnesota. Most of the settlers are Scandinavians and very industrious and efficient. Through the western parts of the state and in the Dakotas the tourist traverses the great wheat raising country of the west. The farms here are conducted on an enormous scale. In the valley of the Red river the wheat fields stretch away for miles on every side and are broken only by occasional patches of timber. These farms of thousands of acres are plowed and sowed and reaped by power machinery.

In the western part of Dakota are the famous Bad Lands. They present a bewildering maze of barren rocks, buttes and hills of fanciful shape, made beautiful by a remarkable variety of strange colorings.

Montana is famous for its copper and cattle. The great cattle ranges are now disappearing before the gradual increase in the number of small farms. Government irrigation projects at various points are making the once barren land fertile. Population becomes more dense every year.

At Livingston a branch road goes south to Gardiner, which is the gateway to Yellowstone park. This wonderful national reserve is one of the most beautiful scenic spots in the world. Its geysers, its bears, its mountains and lakes and sheer ravines have been de-

scribed hundreds of times.

Westward from Livingston the foot hills of the Rockies become larger and shortly the main ranges come into view. After passing Bozeman the tourist traverses the Gallatin valley and comes upon three forks, where the Gallatin, Madison and Jefferson rivers combine to make the Missouri.

The road climbs gradually up the mountains until, just east of Butte the tourist goes over the continental divide at an elevation of 6950 feet.

Butte is the largest mining camp in the world. But the roughness of the early camp days has disappeared and it is now a

launches on Lake McDonald make daily trips up and down during the park season. Among the other chief attractions are Avalanche Basin, Granite Park, Sperry Glacier, Blackfoot Glacier, McDonald Creek, Lincoln Peak, Gunsight Pass, Harrison Glacier, Iceberg Lake, Lake McDermott, and at somewhat greater distances are the Lake St. Mary country, Two Medicine Lake Country, Cutbank Canyon, Triple Divide Mountain, Red Eagle Lake, the Garden Wall and scores of other points of the greatest interest.

From Kalispel to Spokane an extremely interesting section is traversed. It touches the shores



A Deep Canon Near Tower Falls.

modern, well built city. It is possible here to visit one of the great mines and see how copper is taken from the earth at great depths. Anaconda, a little further on, is another copper city. The Washoe smelter is the largest in the world.

From here the road goes via Deer Lodge and the canyon of the Hell Gate river to Missoula. There are four possible routes from Missoula across Idaho. One of these leads north through Ravalli to Kalispel and the Glacier National park. This park was set aside as a public reservation in 1910. It contains Lake McDonald, a charming mountain lake two miles wide and 10 miles long. Steamers and

of rivers and runs through the gorges reaching Pend D'Oreille lake, one of the largest bodies of fresh water in the United States, not including the great lakes. Near Bonner's ferry the tourist enjoys the remarkable Canon of the Kootenai. The coloring of the rocks, water and sky are very striking.

Before reaching Spokane the road goes through the famous Couer D'Alene mining district, made noteworthy some years ago by a great labor war, which led to the trials of Haywood, Moyer and Pettibone.

Not far from here is Hayden lake, a favorite summer resort of the district. It has a fine golf



Lake St. Mary, Glacier National Park.

course and is surrounded by the finest mountain and lake scenery. There is an excellent tavern here of the Swiss Chalet type, which is common in the new summer hotels of the region.

Spokane is a beautiful city of fine residences and excellent business buildings. It is built on a great rock and is the capital of the Inland Empire, as the great grain and fruit raising district surrounding it, has been called.

A large system of electric lines radiates from Spokane in all directions, reaching many points of great interest to the visitor.

Westward from Spokane the Sunset boulevard leads through the Washington grain district to the valley of the Columbia river, disclosing the famous Wenatchee valley fruit district. Land here which could be had a few years ago for almost nothing, now sells for \$2000 an acre, as the result of irrigation. It is one of the greatest apple growing districts in the world and Wenatchee apples are sold all over the United States, in Europe and Australia.

The city of Wenatchee is located on the Columbia river, half way between Seattle and Spokane. The vineyards and orchards of the district surround it. The soil here is very rich and wherever water is available a luxuriant vegetation grows.

Crossing and recrossing the Columbia river the road goes up the

Kittitas valley to Ellensburg and to Lake Keechelus. From the head of the lake Snoqualmie pass is entered. This crosses the Cascade mountains at a height of 3100 feet, after which the highway drops rapidly over excellent roads to the city of Seattle.

Seattle is the largest city in the State of Washington. It began not so many years ago as the site of a saw mill. It has a magnificent harbor on Elliott bay, off Puget Sound. Across the harbor is Admiralty Inlet, behind which rise the snow-capped peaks of the Olympian range of mountains. According to the last census the population of the city was 237,194.

From Seattle a short run southward through Tacoma brings the traveller to the Mt. Ranier National park and the snow covered sides of the great Mt. Ranier.

The National Parks highway is known also as the Yellowstone trail. As a striking demonstration that the route was open from one end to the other for tourists, a relay run has recently been held over it, in which different cars, each travelling 100 miles or more, covered the distance from Chicago to Seattle in 97 hours. The time set for the run was 100 hours, night and day, but the message arrived three hours ahead of schedule. Three hours was gained on the eastern roads, lost and gained again.

ITINERARY NO. 3.

Night Stops—Chicago, Ill.; Madison and La Crosse, Wis.; St. Paul and Alexandria, Minn.; Fargo, Jamestown, Bismarck and Dickinson, N. D.; Terry, Custer, Livingston, Butte and Drummond, Mont.; Wallace, Ida.; Spokane, Waterville, Cle Elum and Seattle, Wash. Eighteen Days, 2480.4 Miles.

Chicago-Madison, 170.8 Miles.

	Miles to	Total Miles
	Out	Return
Chicago	0.0	0.0
Evanston	13.3	13.3
Hubbard's Hill	5.7	19.0
Ravina Park	3.9	22.9
Highland Park	2.6	25.5
Highwood Station	1.6	27.1
Lake Forest	4.9	32.0
Waukegan	7.5	39.5
Zion City	6.2	45.7
Kenosha	9.6	55.3
Racine	10.7	66.0
S. Milwaukee	14.0	80.0
Milwaukee	9.4	89.4
Brookfield	13.2	102.6
Waukesha	3.7	106.3
Delafield	10.7	117.0
Johnson Creek	20.6	137.6
Lake Mills	6.8	144.4
Madison	26.4	170.8

Madison-La Crosse, 145.6

Miles.

	Miles to	Total Miles
	Out	Return
Madison	0.0	0.0
La Crosse	145.6	145.6



A Snow Scene in the Rockies.

Ashton	10.1	10.1	135.5
Springfield Cor- ners	4.3	14.4	131.2
Sauk City	10.5	24.9	120.7
Baraboo	17.3	42.2	103.4
Abelmanns	9.4	51.6	94.0
Reedsburg	8.2	59.8	85.8
Lavalle	7.8	67.6	78.0
Union Center	11.9	79.5	66.1
Elroy	4.6	84.1	61.5
Kendalls	7.1	91.2	54.4
Ontario	13.6	104.8	40.8
Cashton	10.2	115.0	30.6
Portland	5.8	120.8	24.8
La Crosse	24.8	145.6	0.0

La Crosse-St. Paul, 162.1 Miles.

	Miles to	Total Miles Out Return
La Crosse	0.0	0.0 162.1
La Crescent, Minn.	3.3	3.3 158.8
Ridgeway	17.7	21.0 141.1
Witoka	3.6	24.6 137.5
Winona	9.5	34.1 128.0
Lewiston	14.5	48.6 113.5
Utica	4.6	53.2 108.9
St. Charles	5.9	59.1 103.0
Rochester	21.9	81.0 81.1
Pine Island	18.1	99.1 63.0
Zumbrota	6.5	105.6 56.5
Cannon Falls	19.9	125.5 36.6
St. Paul	36.6	162.1 0.0

St. Paul-Alexandria, 148.7 Miles.

	Miles to	Total Miles Out Return
St. Paul	0.0	0.0 148.7
Minneapolis	9.9	9.9 138.8
Osseo	12.3	22.2 126.5
Anako	6.2	28.4 120.3
Elk River	11.6	40.0 108.7
Becker	16.9	56.9 91.8
Clear Lake	7.0	63.9 84.8
Cable	6.0	69.9 78.8
St. Cloud	6.3	76.2 72.5
St. Joe	7.3	83.5 65.2
Avon	7.3	90.8 57.9
Albany	7.1	97.9 50.8
Melrose	15.0	112.9 35.8
Sauk Center	8.9	121.8 28.0
Alexandria	26.9	148.7 0.0

Alexandria-Fargo, 124.2 Miles.

	Miles to	Total Miles Out Return
Alexandria	0.0	0.0 124.2
Garfield	7.1	7.1 117.1
Brandon	6.5	13.6 110.6
Evansville	6.2	19.8 104.4
Melby	5.9	25.7 98.5
Fergus Falls	28.6	54.3 69.9
Rothsay	22.9	77.2 47.0
Barnesville	17.2	94.4 29.8
Fargo	29.8	124.2 0.0

Fargo-Jamestown, 99 Miles.

	Miles to	Total Miles Out Return
Fargo	0.0	0.0 99.0
Valley City	61.3	61.3 37.7
Jamestown	37.7	99.0 0.0

Jamestown-Bismarck, 108.5 Miles.

	Miles to	Total Miles Out Return
Jamestown	0.0	0.0 108.5
Dawson	55.2	55.2 53.3
Bismarck	53.3	108.5 0.0

Bismarck-Dickinson, 120.2 Miles.

	Miles to	Total Miles Out Return
Bismarck	0.0	0.0 120.2
Hebron	79.2	79.2 41.0
Dickinson	41.0	120.2 0.0

Dickinson-Terry, 160.7 Miles.

	Miles to	Total Miles Out Return
Dickinson	0.0	0.0 160.7
Sentinel Butte	60.4	60.4 100.3
Glendive	55.6	116.0 44.7
Fallen	33.5	149.5 11.2
Terry	11.2	160.7 0.0

Terry-Custer, 142.3 Miles.

	Miles to	Total Miles Out Return
Terry	0.0	0.0 142.6
Miles City	39.3	39.3 103.3
Forayth	51.6	90.9 51.7
Custer	51.7	142.6 0.0

Drummond-Wallace, 181.5 Miles.

	Miles to	Total Miles Out Return
Drummond	0.0	0.0 181.5
Bearmount	13.5	13.5 168.0
Missoula	44.6	58.1 123.4
Wallace	123.4	181.5 0.0

Wallace-Spokane, 86 Miles.

	Miles to	Total Miles Out Return
Wallace	0.0	0.0 86.0
Kellogg	11.6	11.6 74.4
Coeur D'Alene	40.7	52.3 33.7
Spokane	33.7	86.0 0.0

Spokane-Waterville, 145.4 Miles.

	Miles to	Total Miles Out Return
Spokane	0.0	0.0 145.4



Steamer on Lake Coeur D'Alene, Idaho.

Custer-Livingston, 185.5 Miles.

	Miles to	Total Miles Out Return
Custer	0.0	0.0 185.5
Billings	57.7	57.7 127.8
Reed Point	67.0	124.7 60.8
Livingston	60.8	185.5 0.0

Livingston-Butte, 139.2 Miles.

	Miles to	Total Miles Out Return
Livingston	0.0	0.0 139.2
Boxeman	26.7	26.7 112.5
Three Forks	34.8	61.5 77.7
Whitehall	43.6	105.1 34.1
Butte	34.1	139.2 0.0

Butte-Drummond, 86.6 Miles.

	Miles to	Total Miles Out Return
Butte	0.0	0.0 86.6
Anaconda	25.8	25.8 60.8
Deer Lodge	26.5	52.3 34.3
Garrison	11.5	63.8 22.8
Drummond	22.8	86.6 0.0

Davenport	36.8	36.8 108.6
Creston	22.3	59.1 86.3
Wilbur	8.6	67.7 77.7
Almira	13.0	80.7 64.7
Coulee City	22.7	103.4 42.0
Waterville	42.0	145.4 0.0

Waterville-Cle Elum, 91.1 Miles.

	Miles to	Total Miles Out Return
Waterville	0.0	0.0 91.1
Wenatchee	26.8	26.8 64.3
Peshastin	20.4	47.2 43.9
Cle Elum	43.9	91.1 0.0

Cle Elum-Seattle, 112 Miles.

	Miles to	Total Miles Out Return
Cle Elum	0.0	0.0 112.0
Easton	15.5	15.5 96.5
Laconia	20.7	36.2 75.8
Bld-A-Wee	12.1	48.3 63.7
North Bend	13.8	62.1 49.9
Redmond	24.2	86.3 25.7
Seattle	25.7	112.0 0.0

MAKE TOURING NOTES ON THIS PAGE

Date...... **Place.**.....

Memo

Memo

Memo

Date...... **Place.**.....

Memo

Memo

Memo

Date...... **Place.**.....

Memo

Memo

Memo

Date...... **Place.**.....

Memo

Memo

Memo

Date...... **Place.**.....

Memo

Memo

Memo

Date...... **Place.**.....

Memo

Memo

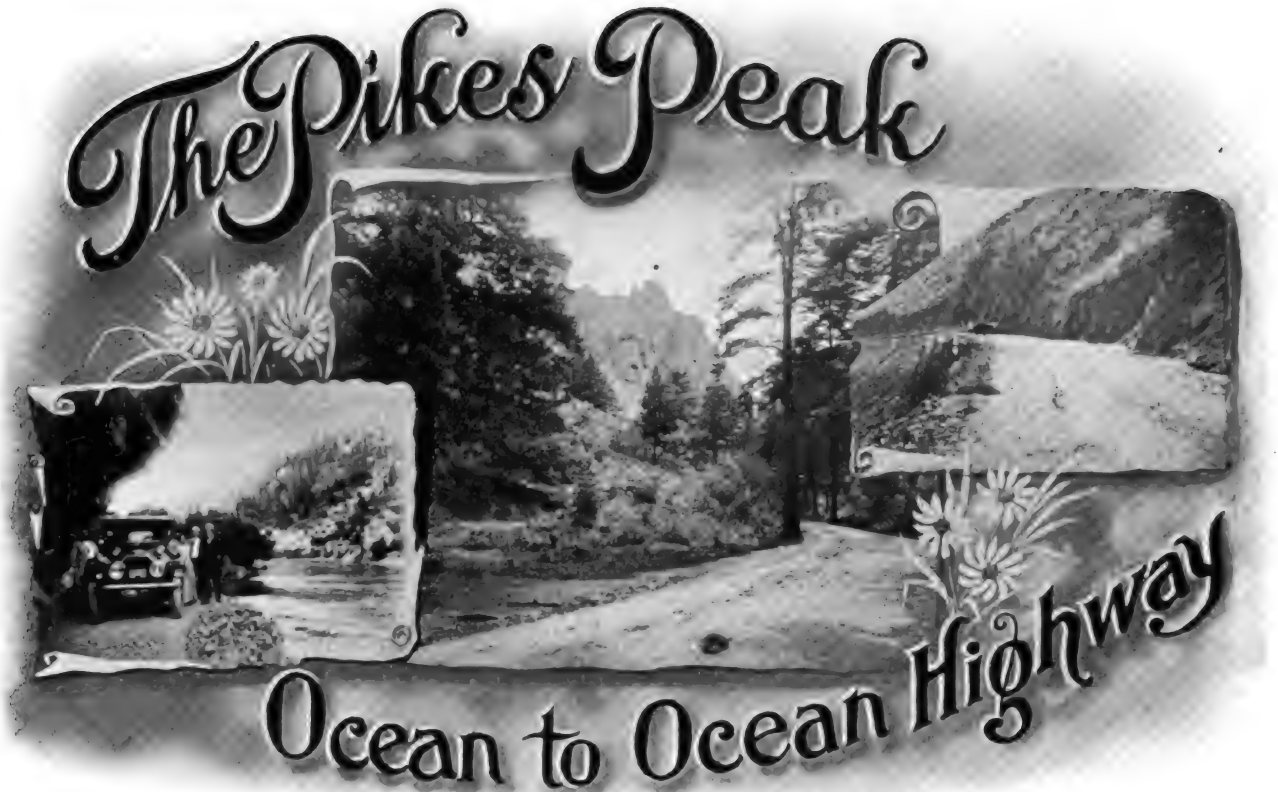
Memo

Date...... **Place.**.....

Memo

Memo

Memo



In the Heart of Colorado.

A CROSS Colorado, between the routes taken by the Lincoln highway and the National Old Trails road is another route leading through some of the greatest scenic splendors of a state that is remarkably endowed with beautiful scenery. This route was originally known as the Lincoln Highway of Colorado, but is now called the Pikes Peak Ocean to Ocean highway.

It may be travelled by eastern tourists using the Ninth Annual Touring number of the Automobile Journal who reach Kansas City along the route of the National Old Trails road or by middle western tourists who can conveniently join that route at any point.

It crosses Kansas and Colorado by a very direct route and reaches Salt Lake City, where the Lincoln highway leads to San Fran-

cisco. The roads are very good in most places and a vast amount of development work has been done upon them. No cross continental route offers more in striking mountain scenery.

Through Kansas the tourist will see chiefly the great western wheat country, and will travel on good roads if the weather is dry. Across the rolling prairies of eastern Colorado the road material is a sandy loam or gravel with a little adobe or clay. Every county along the way is making great effort to improve and shorten the road.

As the tourist goes westward the dim outline of Pikes Peak becomes more positive. In the Pikes Peak region the first of the real mountain scenery is unfolded to the traveller. It is a region of on the continent can offer so great wonders and no area of equal size

a variety of scenery, all of which is so easily accessible.

Among the many things there to fascinate the visitor is the great mountain itself, up which a new road has just been completed by private enterprise—a wide and safe mountain highway of very moderate grades, up which any driver can pilot even an ordinarily good car.

Then there is the Garden of the Gods, North Cheyenne Canon, the High Drive, Williams Canon, the Cave of the Winds, Crystal Park, South Cheyenne Canon, Seven Falls, Mt. Manitou Park, Glen Eyrie, Red Mountain, the Cliff Dwellings, Palmer Park and Stratton Park. Good automobile roads lead to all these points and if the tourist wishes he may spend several days in delightful side trips.

Colorado Springs is the centre

of this remarkable country and from it a great variety of trips may be made—to Denver, Pueblo, the Royal Gorge, Florence and Canon City. Manitou is at the foot of the White mountains, where the road enters Ute pass.

Indian trails worn in the rock by mocassined feet made Ute pass a highway across the Rockies long before a white man had ever seen them. It was through this pass that the Indians journeyed from their mountain homes further west to the springs at Manitou and to the religious observances which they held in the Garden of the Gods.

The route was improved to some extent when the development of Leadville and Aspen and

centuries the dust of nearby volcanoes, located probably near Cripple Creek, poured into this lake. At times the volcanic action destroyed all traces of vegetable and animal life, which later was replaced by growth. Now on the borders of this prehistoric lake fossils of leaves and plants are found in great number, representing 145 species which grow in modern times in the temperate and semi-tropical regions of the hemisphere.

There have also been found fossils of 1000 species of insects, turned to stone under the heavy plaster of dust from the volcanoes. This dust is more than 50 feet deep. At one side of the lake there is a grove of trees of the

Range just ahead.

Buena Vista is a modern town near the fishing and camping grounds of Cottonwood lake. Its swimming pools are fed by hot water from nearby springs.

For the first miles up the Arkansas river the road runs along the bottom of the gorge, with great cliffs overhanging on either side. Sixteen miles above Buena Vista it crosses the river and takes up a course where it has been cut directly into the side of the cliffs, 600 feet above the river. The next stop is Granite, one of the oldest mining camps in Colorado.

From Granite to Leadville are two roads, one known as the river road and the other passing Twin lakes. The view of these lakes from a motor car is said to equal anything that Switzerland has to offer.

A new road through Independence pass crosses the continental divide at a height of 12,000 feet above sea level, although none of the grades approaching it are greater than six per cent.

On the river road the scenery is not so striking, but there are no difficulties to beset the progress of the car. Leadville is one of the oldest and most important of the Colorado mining camps. Lead, zinc, copper, gold and silver have been mined there to the value of \$400,000,000. There is excellent fishing about Leadville and it is the logical start for a climb to the summit of Mt. Massive, the highest peak in the Rockies.

From Leadville to the top of Tennessee pass the road follows an abandoned four per cent. grade of an old narrow gauge railroad. Coming down the Pacific side of the continental divide the grades are more noticeable.

The way runs into Eagle Canon and its passage through the gorge is a wonderful scenic trip, which reaches its climax as the tourist rounds Eagle mountain and is able to look back over the road he has been following. Along the top of this mountain the view is very impressive and it may take the breath of the unaccustomed mountaineer as he looks down upon the mining camps, hanging to the precipitous sides of the mountain.

Continuing through Red Cliff, Gilman, Minturn, Eagle and Gypsum, settlements in the heart of fine fishing country, the road en-



Auto Camping Ground Near Colorado Springs.

other mining camps in the district made transportation necessary. These roads have all recently been rebuilt by the famous Colorado system of convict labor and there are no better mountain roads in the United States.

There are numerous resorts along this part of the trip, at which the tourist may stop. They include Cascade, Green Mountain Falls, Crystola and Woodland park. At Divide of Florissant there is an opportunity for a side trip to Cripple Creek the world's greatest gold mining district in the volume of production.

Geologists say that in remote ages, possibly millions of years ago, there was a lake at Florissant 15 miles long. For many

Redwood species, the petrified stumps of which are from six to 27 feet in diameter.

At Lake George the tourist comes upon the fishing country and in all the mountain streams from this point on it is possible to capture the fine mountain trout for which Colorado is famous. Hartsel, on the South Platte river, is in a good fishing district, and there are hot springs of valuable medicinal properties nearby.

Climbing out of South Park, over Trout Creek pass, the tourist passes the Castle Rocks in Trout Creek Canon and gets his first view of the continental divide just across the valley with Mt. Harvard, Mt. Yale, Mt. Princeton and all the peaks of the Collegiate



Tourist Party on Pikes Peak Highway.

ters the canon of the Grand river. This trip is perhaps the greatest scenic feature of the route.

It begins at Glenwood Springs, which is famous for its hot water bubbling from the earth and its beautiful drives about Hanging lake. It is a resort in the mountains which many travellers will wish to see for several days.

Further westward the road passes Newcastle, where there are coal mines, and Rifle, which is an outfitting point for the big game country, made famous by President Roosevelt's hunt there some years ago. Here the tourist comes upon the fine orchard section of the western slope, and passes through the remarkable fruit raising country of the Grand river valley.

Sometimes the road follows the valley and sometimes it goes along the tops of the Mesas. The ride down Plateau Creek, between the Palisades, is an interesting experience. Through the town of Palisades and Chifton the road again passes a rich orchard section, continuing as far as Grand Junction.

From the Utah line to Salt Lake City the State of Utah has recently spent \$50,000 in improving the roads.

There is every likelihood that the Pikes Peak Ocean to Ocean highway will divert a great many tourists this summer from the main lines of the Lincoln and Old Trails road highways. Pikes Peak

and the district about Colorado Springs have always been extremely popular with travellers. Efforts will be made along route to make tourists comfortable.

ITINERARY NO. 201.

Night Stops—Kansas City, Mo.; Topeka, Salina, Waukeeneey and Colby, Kan.; Limon, Colorado Springs, Leadville, Glenwood Springs, Meeker, Col.; Vernal, Colton, Salt Lake City, Utah. Twelve Days, 1302.8 Miles.

Kansas City-Topeka, 78.5 Miles.

		Total Miles	
		Miles to	Out Return
Kansas City	0.0	0.0	78.5
Muncie	10.0	10.0	68.5
Bonner Springs	8.0	18.0	60.5
Lenape	6.8	24.8	53.7
De Soto	2.3	27.1	51.4
Eudora	9.5	36.6	41.9
Lawrence	8.2	44.8	33.7
Midland	3.0	47.8	30.7
Buck Creek	5.5	53.3	25.2
Perry	7.2	60.5	18.0
Grantville	10.5	71.0	7.5
Topeka	7.5	78.5	0.0

Topeka-Salina, 132.3 Miles.

		Total Miles	
		Miles to	Out Return
Topeka	0.0	0.0	132.3
Silver Lake	13.8	13.8	118.5
Kingsville	2.6	16.4	115.9
Rossville	3.1	19.5	112.8

St. Marys	7.4	26.9	105.4
Belvue	7.2	34.1	98.2
Wamego	7.8	41.9	90.4
St. George	5.7	47.6	84.7
Manhattan	12.7	60.3	72.0
Ogden	12.2	72.5	59.8
Fort Riley	5.5	78.0	54.3
Junction City	4.0	82.0	50.3
Chapman	15.0	97.0	35.3
Detroit	4.0	101.0	31.3
Abilene	6.3	107.3	25.0
Solomon	9.0	116.3	16.0
Salina	16.0	132.3	0.0

Salina-Waukeeneey, 143 Miles.

		Total Miles	
		Miles to	Out Return
Salina	0.0	0.0	143.0
Bavaria	8.5	8.5	134.5
Brookville	6.5	15.0	128.0
Carnelro	10.0	25.0	118.0
Kanopolis	8.5	33.5	109.5
Ellsworth	10.5	44.0	99.0
Wilson	14.0	58.0	85.0
Dorrance	7.5	65.5	77.5
Bunker Hill	7.5	73.0	70.0
Russell	9.5	82.5	60.5
Gorham	8.7	91.2	51.8
Walker	3.0	94.2	48.8
Victoria	4.0	98.2	44.8
Hays	10.5	108.7	34.3
Ellis	15.0	123.7	19.3
Ogallah	10.5	134.2	8.8
Waukeeneey	8.8	143.0	0.0

Waukeeneey-Colby, 82.5 Miles.

		Total Miles	
		Miles to	Out Return
Waukeeneey	0.0	0.0	82.5
Voda	6.5	6.5	76.0
Collyer	5.4	11.9	70.6
Quinter	7.6	19.5	63.0
Buffalo Park	8.6	28.1	54.4
Grainfield	5.6	33.7	48.8
Grinnell	9.0	42.7	39.8
Campus	5.8	48.5	34.0
Oakley	6.5	55.0	27.5
Mingo	15.5	70.5	12.0
Colby	12.0	82.5	0.0



Mountain Road Through the Woods.



At Tennessee Pass Over the Continental Divide.

Colby-Limon, 149 Miles.

	Miles to	Total Miles	Out Return
Colby	0.0	0.0	149.0
Levant	8.8	8.8	140.2
Brewster	10.2	19.0	130.0
Goodland	18.0	37.0	112.0
Buelton	9.8	46.8	102.2
Kanorado	8.0	54.8	94.2
Burlington, Col.	13.0	67.8	81.2
Muskoka	8.5	76.3	72.7
Stratton	9.3	85.6	63.4
Vona	9.0	94.6	54.4
Siebert	6.7	101.3	47.7
Flagler	11.3	112.6	36.4
Arriba	11.9	124.5	24.5
Bovina	6.0	130.5	18.5
Genoa	5.8	136.3	12.7
Limon	12.7	149.0	0.0

Limon-Colorado Springs, 75.7 Miles.

	Miles to	Total Miles	Out Return
Limon	0.0	0.0	75.7
Mattison	21.2	21.2	54.5
Simala	6.2	27.4	48.3
Ramah	4.7	32.1	43.6
Calhan	9.6	41.7	34.0
Peyton	9.8	51.5	24.2
Falcon	9.0	60.5	15.2
Colorado Springs	15.2	75.7	0.0

Colorado Springs-Leadville, 140.8 Miles.

	Miles to	Total Miles	Out Return
Colorado Springs	0.0	0.0	140.8

Colorado City	2.3	2.3	138.5
Manitou	3.4	5.7	135.1
Cascade	4.3	10.0	130.8
Green Mountain			
Falls	3.7	13.7	127.1
Crystola	2.0	15.7	125.1
Edlowe	5.0	20.7	120.1
Divide	3.4	24.1	116.7
Florissant	8.8	32.9	107.9
Lake George	5.2	38.1	102.7
Lidderdale	2.0	40.1	100.7
Springer	4.2	44.3	96.5
Idlewild	3.0	47.3	93.5
Howber	3.0	50.3	90.5
Spinney	5.2	55.5	85.3
Hartsel	11.0	66.5	74.3
Haver	9.0	75.5	65.3
Bath	8.5	84.0	56.8
Newell	6.3	90.3	50.5
Buena Vista	10.0	100.3	40.5
Wild Horse	3.5	103.8	37.0
Americus	3.5	107.3	33.5
Barre	3.5	110.8	30.0
Waco	10.0	120.8	20.0
Snowden	11.0	131.8	9.0
Leadville	9.0	140.8	0.0

Leadville-Glenwood Springs, 88.5 Miles.

	Miles to	Total Miles	Out Return
Leadville	0.0	0.0	88.5
Keedlar	5.8	5.8	82.7
Climax	4.1	9.9	78.6
Mitchell	2.8	12.7	75.8
Pando	5.0	17.7	70.8

Redcliff	5.0	22.7	65.8
Belden	2.9	25.6	62.9
Minturri	4.3	29.9	58.6
Avon	7.2	37.1	51.4
Edwards	3.0	40.1	48.4
Allenton	3.1	43.2	45.3
Wolcott	4.0	47.2	41.3
Sherwood	2.5	49.7	38.8
Ortega	3.0	52.7	35.8
Eagle	5.0	57.7	30.8
Gypsum	5.9	63.6	24.9
Dotsera	6.8	70.4	18.1
Shoshone	7.8	78.2	10.3
Grizzly	5.0	83.2	5.3
Glenwood Springs	5.3	88.5	0.0

Glenwood Springs-Meeker, 75.9 Miles.

	Miles to	Total Miles	Out Return
Glenwood Springs	0.0	0.0	75.9
South Canon	3.8	3.8	72.1
Chacra	3.8	7.6	68.3
New Castle	7.9	15.5	60.4
Chapman	4.0	19.5	56.4
Silt	6.7	26.2	49.7
Antlers	3.2	29.4	46.5
Ride	4.0	33.4	42.5
Meeker	42.5	75.9	0.0

Meeker-Vernal, 118 Miles.

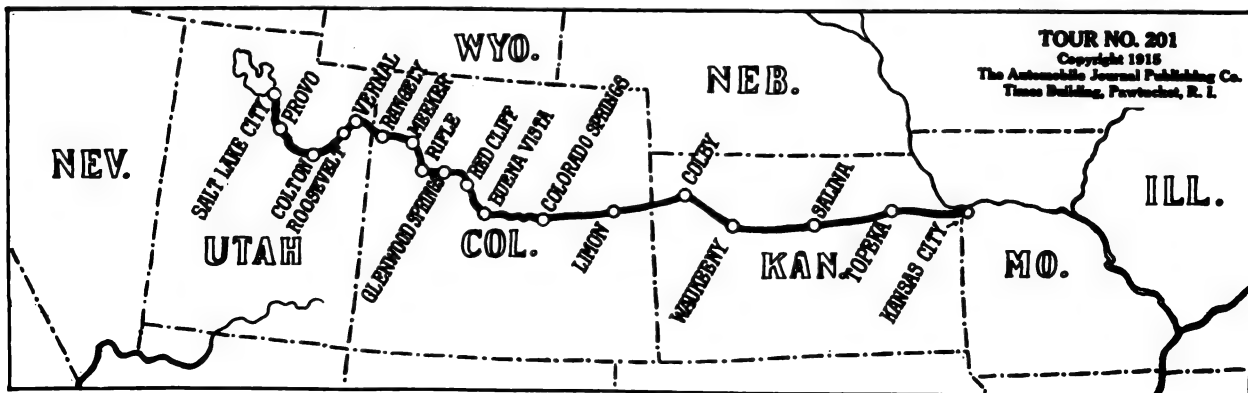
	Miles to	Total Miles	Out Return
Meeker	0.0	0.0	118.0
Rangleley	61.0	61.0	57.0
"K" Ranch	22.0	83.0	35.0
Jensen	19.4	102.4	15.6
Vernal	15.6	118.0	0.0

Vernal-Colton, 115.5 Miles.

	Miles to	Total Miles	Out Return
Vernal	0.0	0.0	115.5
Moffat	22.5	22.5	93.0
Roosevelt	10.2	32.7	82.8
Myton	11.1	43.8	71.7
Duchessne	21.1	64.9	50.6
Colton	50.6	115.5	0.0

Colton-Salt Lake City, 103.1 Miles.

	Miles to	Total Miles	Out Return
Colton	0.0	0.0	103.1
Thistle	33.7	33.7	69.4
Spanish Fork	13.3	47.0	56.1
Springville	4.8	51.8	51.3
Provo	6.0	57.8	45.3
Pleasant Grove	10.5	68.3	34.8
Alpine	3.2	71.5	31.6
Lehi	2.6	74.1	29.0
Salt Lake City	29.0	103.1	0.0



A SOUTHERN ROUTE TO THE PACIFIC.

THE extreme southerly route to the Pacific coast is important because in the early spring or late fall the roads are likely to be in better condition than the routes further north, and also because the south has been developing a great number of motorists, some of whom may desire to make a transcontinental trip through their own section of the country.

Southern roads have not been developed as rapidly as those in the north and the great popularity of motor touring is younger in the south than in the north. Yet great strides have been made since the Glidden tours first traversed that part of the country and the south is now thoroughly interested in the good roads movement.

Very fair highways already connect its principal cities and the trip can be made to the Pacific through the country south of the Mason and Dixon line without hardship. From New York to Washington the route follows that of the National Old Trails road, given in Itinerary No. Two. From Washington it leads to Atlanta over the Washington-New Orleans route given in Itinerary No. 107, and from Atlanta to Memphis on the route from Atlanta to Louisville, which is given in Itinerary No. 108.

From Memphis the route leads over Itinerary No. 202 in a south-westerly direction across Arkansas, through Forest City, Clarendon, Hot Springs and Texarkana, Dallas, Abilene, Big Springs, Ft. Stockton and along the United States and Mexican border line through Sierra Blanca, El Paso, Deming, Tucson, Phoenix and Yuma to San Diego and Los Angeles, whence it follows Itinerary No. 2 to San Francisco.

The roads from Phoenix, Ariz., to San Diego are those over which a long distance road race has been held annually for several years past and they are in excellent condition. From El Paso to Phoenix they are equally good. In fact, the western portion of this route was that taken recently by a Stutz car, which made the run from San Diego to New York in 11 days, breaking all previous records.

ITINERARY NO. 202. Memphis to Los Angeles.

Night Stops—Memphis, Tenn.; Clarendon, Hot Springs and Texarkana, Ark.; Dallas, Abilene, Big Spring, Fort Stockton, Alpine, Sierra Blanca and El Paso, Tex.; Deming, N. M.; Willcox, Tucson, Phoenix and Yuma, Ariz.; El Centro, San Diego and Los Angeles, Cal. Eighteen Days, 2423.7 Miles. Memphis-Clarendon, 93.2 Miles.

	Miles to	Total Miles
	Out	Return
Memphis	0.0	0.0
Ferry to Mound City, Ark.		
Marion	6.0	6.0
		93.2

Hot Springs-Texarkana, 138.3 Miles.

	Miles to	Total Miles
	Out	Return
Hot Springs	0.0	0.0
Lawrence	6.4	6.4
Social Hill	18.9	25.3
Friendship	9.6	34.9
Arkadelphia	9.3	44.2
Dobyville	15.9	60.1
Okolona	6.0	66.1
Boughton	12.7	78.8
Prescott	5.2	84.0
Emmet	8.5	92.5
Hope	9.1	101.6
Fulton	14.2	115.8
Homan	7.8	123.6
Mandeville	8.3	131.9
Texarkana	6.4	138.3

Texarkana-Dallas, 217 Miles.

	Miles to	Total Miles
	Out	Return
Texarkana	0.0	0.0
		217.0



Pacific Highway Between the Expositions.

Madison	37.5	43.5	49.7	Leary, Tex.	10.4	10.4	206.6
Forrest City	4.5	48.0	45.2	Hooks	4.6	15.0	202.0
Beck's Spur	4.0	52.0	41.2	New Boston	7.3	22.3	194.7
Goodwin	10.5	62.5	30.7	Boston	1.3	23.6	193.4
Wheatley	5.2	67.7	25.5	De Kalb	12.7	36.3	180.7
Brinkley	10.0	77.7	15.5	Annona	19.2	55.5	161.5
Clarendon	15.5	93.2	0.0	Clarksville	9.4	64.9	152.1
				Detroit	13.5	78.4	138.6
				Blossom	9.0	87.4	129.6
				Paris	9.7	97.1	119.9
				Brookston	10.2	107.3	109.7
				Hightown	2.7	110.0	107.0
				Petty	3.6	113.6	103.4
				Honey Grove	6.7	120.3	96.7
				Windom	5.4	125.7	91.3
				Dodd City	4.5	130.2	86.8
				Bonham	6.3	136.5	80.5
				Whitewright	15.4	151.9	65.1
				Pilot Grove	6.4	158.3	58.7
				Sedalia	5.8	164.1	52.9
				Anna	7.2	171.3	45.7
				Melissa	4.7	176.0	41.0
				McKinney	7.7	183.7	33.3
				Plano	14.1	197.8	19.2
				Richardson	6.0	203.8	13.2
				Vickery	6.1	209.9	7.1
				Dallas	7.1	217.0	0.0

Clarendon-Hot Springs, 139.6 Miles.

	Miles to	Total Miles
	Out	Return
Clarendon	0.0	0.0
Ferry to Roe.		
Stuttgart	21.4	21.4
Hazen	20.5	41.9
Carlisle	9.0	50.9
Lonoka	11.1	62.0
Argenta	23.2	85.2
Little Rock	1.1	86.3
Collegeville	15.2	101.5
Benton	8.2	109.7
Fairplay Crossing	6.2	115.9
Fuller Crossing	1.5	117.4
Lonsdale	6.8	124.2
Hot Springs	15.4	139.6

Dallas-Abilene, 207.1 Miles.

	Miles to	Total Miles	Out Return
Dallas	0.0	0.0	207.1
Grand Prairie.....	13.1	13.1	194.0
Arlington	6.5	19.6	187.5
Handley	6.5	26.1	181.0
Fort Worth	5.5	31.6	175.5
Ben Brook	10.3	41.9	165.2
Aledo	9.9	51.8	155.3
Annetta	6.3	58.1	149.0
Weatherford	7.6	65.7	141.4
Mineral Wells.....	22.3	88.0	119.1
Palo Pinto	12.1	100.1	107.0
Caddo	24.6	124.7	80.4
Breckenridge	15.4	140.1	65.0
Albany	24.9	165.0	40.1
Hamblly	33.3	200.3	6.8
Abilene	6.8	207.1	0.0

Abilene-Big Spring, 110.6 Miles.

	Miles to	Total Miles	Out Return
Abilene	0.0	0.0	110.6
Tye Station	7.0	7.0	102.7



Typical Scene in the Great American Desert in Nevada.

Merkel	8.3	16.3	94.4
Trent	6.5	22.7	87.9
Sweetwater	18.7	41.4	69.2
Roscoe	8.8	50.2	60.4
Loraine	10.9	61.1	49.5
Colorado	9.4	70.5	40.1
Westbrook	10.3	80.8	29.8
Iatan	9.6	90.4	20.2
Conhonia	8.4	98.8	11.8
Big Spring	11.8	110.6	0.0

Big Spring-Fort Stockton, 177.7 Miles.

	Miles to	Total Miles	Out Return
Big Spring	0.0	0.0	177.7
Stanton	24.2	24.2	153.5
Midland	19.4	43.6	134.1
Warfield	10.4	54.0	123.7
Odeasa	12.0	66.0	111.7
Y Ranch	31.4	97.4	80.3
Acock Range	12.2	109.6	68.1
Edwards Ranch	7.2	116.8	60.9
Grand Falls	28.0	144.8	32.9
Fort Stockton	32.9	177.7	0.0

Fort Stockton-Alpine, 90.7 Miles.

	Miles to	Total Miles	Out Return
Fort Stockton	0.0	0.0	90.7

Alpine-Sierra Blanca, 131.6 Miles.

	Miles to	Total Miles	Out Return
Alpine	0.0	0.0	131.6
Marfa	26.4	26.4	105.2
Aragon	10.9	37.3	94.3
Valentine	24.7	62.0	69.6
Wendell	8.7	70.7	60.9
Chispa	7.3	78.0	53.6
Lobo	12.0	90.0	41.6
Dalberg	13.5	103.5	28.1
Chocar	4.7	108.2	23.4
Torbert	4.4	112.6	19.0
Grayton	9.1	121.7	9.9
Sierra Blanca	9.9	131.6	0.0

Sierra Blanca-El Paso, 92.4 Miles.

	Miles to	Total Miles	Out Return
Sierra Blanca	0.0	0.0	92.4
Etholen	4.3	4.3	88.1
Lasca	5.4	9.7	82.7
Finley	13.1	22.8	69.6

Separ	5.8	40.1	97.0
Lisbon	9.2	49.3	97.8
Lordsburg	10.8	60.1	77.0
Stein's Pass	20.3	80.4	56.7
Vanar, Ariz	7.5	87.9	49.2
San Simon	7.9	95.8	41.3
Holt	12.1	107.9	29.2
Bowie	4.4	112.3	24.8
Cholla	4.2	116.5	20.6
Lusena	3.4	119.9	17.3
Glade	9.3	129.2	7.9
Willcox	7.9	137.1	0.0

Willcox-Tucson, 89.2 Miles.

	Miles to	Total Miles	Out Return
Willcox	0.0	0.0	89.2
Cochise	11.1	11.1	78.1
Dragoon	9.8	20.9	68.3
Benson	18.7	39.6	49.6
Mescal	10.4	50.0	39.2
Vall	19.1	69.1	20.1
Esmond	4.5	73.6	15.6
Willmot	8.5	82.1	7.1
Tucson	7.1	89.2	0.0

Tucson-Phoenix, 126.8 Miles.

	Miles to	Total Miles	Out Return
Tucson	0.0	0.0	126.8
Rillito	18.2	18.2	108.6
Red Rock	16.2	34.4	92.4
Florence	24.5	58.9	57.9
Mesa	42.1	101.0	15.8
Tempe	7.0	108.0	8.8
Phoenix	8.8	126.8	0.0

Phoenix-Yuma, 206.9 Miles.

	Miles to	Total Miles	Out Return
Phoenix	0.0	0.0	206.9
Cashion	12.0	12.0	194.9
Coldwater	2.5	14.5	192.4
Liberty	12.0	26.5	180.4
Buckeye	6.0	32.5	174.4
Palo Verde	6.7	39.2	167.7
Arlington	11.0	50.2	156.7
Agua Caliente	42.7	92.9	114.0
Palomas	10.5	103.4	103.5
Castle Dome	59.3	162.7	44.2
Gila City	25.5	188.2	18.7
Done	0.5	188.7	18.2
Yuma	18.2	206.9	0.0

Yuma-El Centro, 102 Miles.

	Miles to	Total Miles	Out Return
Yuma	0.0	0.0	102.0
Ogilvy, Cal	29.5	29.5	72.5
Drylyn	7.3	36.8	65.2
Glamis	11.2	48.0	54.0
Mammoth	13.5	61.5	40.5
Brawley	27.0	88.5	13.5
Imperial	9.5	98.0	4.0
El Centro	4.0	102.0	0.0

El Centro-San Diego, 124.2 Miles.

	Miles to	Total Miles	Out Return
El Centro	0.0	0.0	124.2
Devil's Canyon	46.0	46.0	78.2
El Campo	25.5	71.5	52.7
Potrero	9.5	81.0	43.2
Dulzura	13.2	94.2	30.0
Jamul	8.5	102.7	21.5
Oakdale	1.7	104.4	19.8
Spring Valley	7.3	111.7	12.5
San Diego	12.5	124.2	0.0

From here follow route two.

The New England Master Tour



Eleven Days of Perfect Motoring.

NEW ENGLAND, the first great touring ground of American motorists, has steadily maintained its position as the most popular of all that have since been developed. For this there are many reasons. As it is the oldest and one of the most thickly populated sections of the country, its roads are much finer than most sections of the United States.

Yet man has never been able to bend to his uses great sections of its country, which is wild, rocky and broken, affording a sharp contrast to the highly developed communities which dot its more fertile reaches. There is the greatest possible variety in its many attractions—rivers, water falls, mountains, hills, lakes and valleys. It is a district of richest historic interest—for here the white man began its subjugation of a new continent and in every early movement New Englanders

led among the shapers of American destiny.

Furthermore, there is no region in America more thickly sprinkled with the finest hotels. The tourist here may secure the greatest possible comfort day after day that the wanderer can find anywhere. The frequency with which hostelries of the first class punctuate the highways makes it possible for the tourist to control absolutely the speed at which he travels. There is never any need of a long grinding run to reach the next hotel—there is one at hand every few miles. So the daily runs may be as long or as short as the tourist pleases.

These are the attractions that draw tourists from all parts of the country and bring them back year after year. Most travellers from other sections approach New England through New York City. For that reason the two New England

tours given in the Ninth Annual Touring number both start and end in New York.

It is obvious that they can be used by New Englanders living along the route or by others after a short run from any point over the well developed New England trunk lines. As given this "Master Tour" of New England occupies 11 days of very easy running. If the tourist has a taste for steady driving he should have no difficulty in reducing it to half that time.

The tour leaves New York over the Old Boston Post road, along Long Island sound, passing through many interesting old towns with historical associations. These towns are now largely residential suburbs of New York City and contain many fine homes and beautiful estates. At Rye, N. Y., is the Haviland Inn, which has been operated since colonial times



Lake Mahkeenac as Seen from Shadow Crook, Lenox, Mass.

and was referred to enthusiastically in Washington's diary as a good one in his day. In New Rochelle, which was founded in 1686 by the Huguenots, is the home of Thomas Paine. At Mamaroneck is another famous old inn, known as the Boston Post Road Inn. It was used as General Howe's headquarters when he was in pursuit of Washington after the battle of Long Island. Nearby is the house in which J. Fenimore Cooper was born and in which he wrote many of his famous Indian stories.

In Greenwich, Conn., the first town in New England passed by this route, is the home of General Putnam on East Putnam avenue. Some of the original stone steps

down which the general is said to have ridden his horse to escape the British under Tryon are still to be seen. Millbank, once the home of Boss Tweed, is a fine country estate. Darien was the scene of the capture of the Rev. Moses Mather and his congregation by the British in 1781. His little brick church still stands by the old post road. Norwalk was burned by the British during the revolution, but many quaint old houses that survived are still to be seen.

Bridgeport is a thoroughly industrial city, the largest in volume of manufactures in the State of Connecticut. It was the home of P. T. Barnum and is still the winter quarters of Barnum's cir-

cus. Seaside park, along the shore of the sound, is one of the most beautiful marine parks in the United States. It was presented to the city by Barnum and in it are monuments to Barnum and Elias Howe, the inventor of the sewing machine, who was also a Bridgeport resident.

Along the old Boston Post road are many moss covered mile stones set up by Benjamin Franklin when he was colonial postmaster-general. The mileage is said to have been determined by an instrument invented by the postmaster-general himself, which showed the number of revolutions made by the wheels of his cart in traversing the road. It was in fact a rude form of odometer.

After passing Stratford the road turns north through the picturesque Housatonic valley toward the Berkshires. Ansonia is a manufacturing town given over to brass and iron foundries, and Waterbury is chiefly known in the world of commerce for the clocks and watches it has produced for many, many years.

From Waterbury the route follows the Naugatuck valley, which gradually becomes narrower to Thomaston, named after Seth Thomas, the owner of the great clock factory, which is the town's chief industry. Winsted lies at the junction of the Mad and Still rivers. Haystack mountain is passed just before the road enters Canaan. Here the Housa-



Prospect Lake, One of the Pretty Little Sheets of Water That Dot the Berkshire Hills.



Over the Litchfield Hills in the Housatonic Valley.

tonic itself is reached and the road passes the marble quarries at Ashley Falls and Sheffield, and enters the Berkshires, a very beautiful district of hills, mountains and rivers. Lenox, the night stop, is in the heart of the Berkshires.

Out of Lenox the next morning the tourist comes to Pittsfield, the metropolis of the Berkshires and the very heart of that interesting section. The town was settled in 1752 and took its name from William Pitt, the English premier, who was regarded as a friend of the American colonists.

From Pittsfield the road continues through Lanesboro and South Williamstown to Williamstown, the site of Williams college. President Garfield graduated from this college and his son is now president of it. It is one of the most prominent of the smaller colleges of the country and it has very attractive buildings ranged around a handsome campus. Near Williamstown the road passes Mount Graylock, the highest peak in Massachusetts. Some of the wildest scenery in the State of Massachusetts is to be found in this mountainous locality.

At Pownal, Vt., the road goes up a steep rise and then descends into Bennington. Here there is a monument 306 feet high and erected at a cost of \$112,000 to commemorate a battle fought just across the New York state line at Hoosic. Bennington was the home of Ethan Allen and

Seth Warner of revolutionary fame, and later it gave the world Moses Robinson, Isaac Tichenor and William Lloyd Garrison.

Among other points of interest is the Catamount monument. This was erected in commemoration of a struggle between the Green mountain men and the New York colonists. The New Yorkers were undertaking to add the territory to their colony. The mountaineers killed a catamount and hung its dead body over the door of an inn in which their opponents were feasting as a warning of what might come if they persisted in their attempt to subjugate the country.

Manchester has long been one of the finest summer resorts in the country. The golf links there-

about are especially fine and the town is the summer golf capital. Many important national contests are held on its splendid links.

Crossing the Connecticut river on the fourth day the road goes through the Peru mountain pass and proceeds through many pleasant villages to Sunapee Lake, N. H., 1104 feet above the sea in the hills of Sullivan and Merrimac counties. The lake is about 10 miles long and is bordered by many charming bays and coves, ranging from one to three miles in width. Not far from the lake is Mount Sunapee, a picturesque and rugged hill. The bass fishing is remarkably fine. From the lake are visible Mounts Kearsarge, Croyden and Cardigan.

The next day's run takes the tourist to the White mountains by way of Plymouth on the Pemigewasset river. From here Mt. Prospect, 2072 feet high, is clearly visible to the northeast. A splendid outlook over the country surrounding is obtainable from this peak, including many famous mountains from Monadnock on the south to Moosilauke to the northwest. Among the points of interest about the mountain itself are the Avalanche, the Miser's cave and the cold and boiling springs. Plymouth was settled in 1764. The house where Daniel Webster made his first plea to a jury is still standing. Nathaniel Hawthorne died there.

The route goes through West Campton. From here Mount Welch is a prominent object in the landscape. Mt. Prospect can still be seen; the Sandwich moun-



Mt. Wachusetta on the Massachusetts Reservation.



View of Little River as It Tumbles over Bolton Falls, Vermont.

tains are on the east and Livermore Falls are in the vicinity. The Devil's den is a deep cave at Campton Hollow. The Franconia mountains are plainly visible from Durgin's hill.

Approaching Woodstock a very fine view of the Franconia mountains is available. Some one has said of it, "the arrangement of the principal mountains in a half sexagon—so that we get a strong impression of their mass and yet

see their separate steely edges gleaming with different lights, running down to the valley, is one of the rare pictures of New Hampshire. What a noble combination—those keen contours of the Haystack pyramids and the knotted muscles of Mount Lafayette beyond."

At Franconia Notch the tourist finds himself in the midst of the towering peaks. At the foot of the climb is a wonderful ravine 700

feet long and 20 feet wide, with precipitous cliffs 60 to 70 feet high on either side. At the upper end the ravine narrows to 10 feet in width. At certain seasons the water thunders through this natural chute. Opposite is Mt. Liberty and Mt. Pemigewasset behind, while a fine view is afforded from the hotel of the rich southern valley.

The Franconia notch, through which the tourist goes, is five miles long and less than a half mile wide, and is the western fringe of the Franconia mountains. The small district about is remarkably rich in scenic interest. Few spots of like area in America can equal it in that respect. Echo lake is a short distance north. It is a calm, deep and very beautiful sheet of water, which during the day time reflects vividly the surrounding objects. It gets its name from the fact that echos, startlingly clear, are roused by any sharp noise along its shore or on its surface.

Bald mountain, near the hotel, is not difficult to climb, and it affords a fine view of the hills to the north, Haystack mountain to the east, Mt. Lafayette on the left and Mt. Profile on the right. From the summit of Mt. Profile a climb of from two to three hours, the view displays most of the points visible from Bald mountain and shows Mt. Washington in the distance also. Mt. Profile has been known also as Cannon mountain, from the fact that a stone at the summit somewhat resembles a cannon in shape. A brook runs down the mountain and after a rain it churns along over some



In the White Mountains of New Hampshire: At Left, Looking Toward Mt. Washington; at Right, Artist Falls Near North Conway.



View of Franconia Notch and Bald Peak in the White Mountain Region.

very pretty cascades.

The Profile consists of enormous masses of rock projecting from the mountain, delineating exactly the features of an old man's head and face. It has a firm chin, lips slightly parted and a massive forehead. The legend of the "Great Stone Face," which was the subject of one of Hawthorne's masterly stories, referred to this phenomenon. Profile lake or "The Old Man's Washbasin," is nearby. From it Eagle cliff, 1500 feet high, can best be seen.

There is another very interesting climb up Mt. Lafayette, from which the country—mountains, rivers and lakes—for 50 miles in some directions, can be seen.

The next day's run can be accomplished in little more than an hour, allowing the tourist plenty of time to explore more points in this remarkable country. It leads past the Twin Mountains on the heights above the Ammonoosuc river to Bretton Woods.

The cog railway to the summit of Mt. Washington leaves from a station in the hotel grounds and on each trip the tourists are allowed three hours on the summit of the mountain. Accommodations may be secured at the summit by those who wish to stay at the top over night.

It is hard for the modern traveller who makes the trip to the

top so easily and conveniently, to realize the hardships of the first pioneers, or understand the remarkable feeling of the Indians, who were deterred by superstition from visiting the top of the mountain.

The White mountains were called Aglochook by the Indians, a name which signified "the snowy forehead and the home of the great spirit." There was a legend among them that none who went up the peaks ever returned. They told, too, stories of an ancient chief who had been

rescued from a flood, which swept over the valleys, by the spirits, who removed him and family to the peak until the water had passed. Another chief is supposed to have gone there to converse with messengers from the gods and to have been taken to heaven in a fiery chariot.

The mountains are supposed to have been discovered by Darby Field, who came up from the coast in 1642. The Indians endeavored to persuade him not to make the ascent, but he did, and finding some crystals on the mountain that he thought were diamonds, he called the mountains the "Crystal Hills." In 1820 a party of influential Americans spent a night on the summit and gave the various peaks the names of the presidents, which they still bear.

From Bretton Woods the tourist goes through Crawford notch to Glen station and Intervale. Glen station is in full view of all the presidential peaks and is near the Peabody river. The road goes over Tug of War hill and passes the Willey house, which was buried with its inmates in 1826 by an avalanche.

It then runs along the valley of the Saco river, through the beautiful "Intervales" of the great ravine. At Freyburg, Me., "Jockey Cap" is passed and near Bridgeton there is a run along the charming shores of Long lake. The tourist is now out of the mountains and into the rolling beautiful country of farms and lakes. The approach



Majestic Mt. Kearsarge as Seen from Intervale, N. H.

to Poland Spring, the night stop, is made through country dotted with lakes and ponds. Poland Spring is nationally famous for the purity of its water.

From Poland Spring the route goes through Portland and Portsmouth to Newcastle, just outside of that city. Portland, which was settled in 1632, bore for a time the name of Casco Neck, but was destroyed several times by Indians. When it came under the Massachusetts government it was known for a long time as Falmouth. It was stormed and burned once by Indians and French and was bombarded and ruined during the revolution by the British fleet.

From Portland the road fol-

low and the sand is fine and firm and of gray color. At one end is Cape Neddick, which extends far out into the sea, with a curious rocky islet, called "The Nubble," off its point.

Newcastle, about two miles from Portsmouth, was originally a fishing village.

From Newcastle the route goes down the coast through some of the oldest and most highly developed New England towns to Boston. Salisbury is near the Merrimac river and adjacent to Salisbury beach, which was vividly described by Whittier in a poem called "The Tent on the Beach." The beach is a very fine one and is six miles long.

Newburyport is a very old mari-

time city and the home of a group of powerful shipping masters. The Roger Williams house still stands in the town. It was the scene of several trials during the witchcraft delusion. Outside the town is Gallows hill, where the 19 people were put to death because they had been found to be bewitched.

Salem, the oldest city of the Massachusetts colony, is situated on two inlets of the sea. This was once a centre of the East In-



Lake Sunapee, N. H., in the Midst of Romantic Scenery, and the Home of Gamy Bass.

lowers a route a few miles inland to avoid the many bays that dent the coast. It is only a few miles, however, from the maritime towns and summer resorts which abound on the coast all the way to Portsmouth. This is the only seaport in the State of New Hampshire and before 1807 it was the capital of the state. In the colonial days the place was heavily fortified and equipped with batteries of many guns. It had stout stockades, which in the main protected it from marauding Indians.

Across from Portsmouth on an island included in the town of Kittery, Me., is the United States navy yard. York Beach, which is passed as the tourist nears Portsmouth, is one of the best on the coast. It is a mile and a half long

time city and many ships were built there in the days of the great American merchant marine, and much foreign commerce passed through the port. When that era passed and such foreign trade as was continued went through Boston and New York, it turned like so many other New England towns to manufacturing. For many years there was much prejudice between the old maritime aristocracy and the new-rich manufacturers, as was the case in many other similarly situated towns. But those bitternesses have passed with time.

Silver mines were opened near Newburyport in 1875 and were said for a time to yield the metal more richly than any of the Nevada mines.

Lynn is a manufacturing city with a fine harbor on Massachusetts bay. It was founded in 1629 and named for Lynn Regis, the home of its first pastor in England. It is now a great shoe manufacturing city. The trade there dates back to 1750.

Swampscott, not far from Lynn, is famous as a watering place for the elite of Boston and the surrounding towns.



Typical View of the Rugged Character of the Sea Coast in Maine.

Boston has hundreds of points of great interest, too numerous and too well known to be taken up in detail. Among them are Bunker Hill monument, Faneuil hall, State house, Shaw monument, Old South Meeting house, Old North church, Old State house, King's chapel, Park Street church, St. Paul's church, Boston Athanaeum, Paul Revere's house, Museum Boston Society of Natural History, Public library, Harvard university, the suburb of Concord, the water front and so on.

From Boston the road goes south through Providence and skirting the west shore of Narragansett bay, reaches the sound and goes along the shore to New London. This route as far as Providence is described elsewhere in the touring number. Leaving Providence the tourist sees numerous interesting and pretty shore towns on the way to Narragansett Pier, which has long been a famous American watering place. The pier itself was destroyed some years ago and has not since been rebuilt. There are fine roads near here and excellent bathing in a light surf. Commodore Oliver Hazard Perry, whose brilliant victory in the war of 1812 over the British fleet at Put-in-Bay, Ohio, in Lake Erie, is much celebrated, was born in Narragansett. Mystic is near Mystic Island, long a quiet, but popular summer resort.

From there the road goes through Groton, across the

Thames river to New London. In 1698 Captain Kidd was not a stranger in these parts and he is said to have buried on Gardener's Island 75 ounces of gold, 633 ounces of silver, and a large number of precious stones, which were recovered the following year by the Earl of Bellomont, who was governor at Boston. During the revolution the Connecticut navy, consisting of 23 vessels, made New London its headquarters.

Benedict Arnold, the American traitor, appeared off New London in 1781 with a fleet and a large force of British troops and having

plundered and sacked the town he burned it. A massacre of Americans by the British under the command of American Tories was alleged to have taken place after the surrender. Old Fort Griswold is a place still much visited, and near it stands a monument to the men who are said to have been massacred.

The final day's run takes the tourist through New Haven, the seat of Yale university, and Bridgeport to New York. Chief Justice Waite was born in Lyme. Old Saybrook is not far from Saybrook Point. A fort was erected there in colonial times to protect the settlement, which was established by the Plymouth colony.

Near Guilford is a point called Sachems Head, from the fact that two Indian chiefs who were enemies met here in conflict and one of them left the head of the other hanging in the crotch of an oak tree, where it remained undisturbed for many years. The shore near Branford, another village, has long been lined with summer hotels.

John Davenport, a powerful pastor of the church of England in London, joined the Puritan wing of the church and was forced to come with his people to the New World. They stayed for about a year in Boston and then sailed for a point on the shore of the sound, where they founded New Haven. This was the wealth-



Loon Lake, One of the Small Bodies of Water in Rangeley Lake Region.



Distinctive Beach Scene on the Connecticut Shore of Long Island Sound.

iest colony of any that settled in the New England states. Yale college was transferred to the town in 1717.

In addition to its historical and academic glories the town is a thriving manufacturing place.

New Haven has been called "The City of Elms." It is located on a flat alluvial plain at the head of a bay which runs in from Long Island sound. For years the town had a very large West India trade and the day of the great American merchant marine many ships plied in and out of its harbor.

There are beaches at Branford and Guilford, near the city, and there is a fine drive down the east side of the harbor to the old Forts Hale and Wooster. Fort Wooster was built in 1814 and is now in ruins. About 200 yards from the fort is a cemetery of the Quin-nipiac Indians and a mile and half away is Fort Hale, which was re-built during the Civil War, but has not been used for a long time.

From New Haven the route goes onward to Bridgeport and thence into New York City.

ITINERARY NO. 15.

Night Stops—New York, Waterbury, Conn.; Lenox, Mass.; Manchester, Vt.; Sunapee Lake, Profile House, Bretton Woods, N. H.; Poland Springs, Me.; Newcastle, N. H.; Boston, Mass.; New London, Conn.;

New York City. Eleven Days, 899.9 Miles.

New York-Waterbury, 89 Miles.

	Miles to	Out	Total Miles
		Return	
New York	0.0	0.0	89.0
New Rochelle	17.7	17.7	71.3
Mamaroneck	3.4	21.1	67.9
Rye	3.7	24.8	64.2
Port Chester	1.7	26.5	62.5
Greenwich	3.1	29.6	59.4
Stamford	5.1	34.7	54.3
Darien	4.5	39.2	49.8
Norwalk	4.2	43.4	45.6
Westport	3.3	46.7	42.3
Southport	4.3	51.0	38.0
Bridgeport	6.2	57.2	31.8
Stratford	3.7	60.9	28.1
Shelton	9.8	70.7	18.3
Derby	0.3	71.0	18.0
Seymour	5.6	76.6	12.4
Naugatuck	7.3	83.9	5.1
Waterbury	5.1	89.0	0.0

Waterbury-Lenox, 69.1 Miles.

	Miles to	Out	Total Miles
		Return	
Waterbury	0.0	0.0	69.1
Waterville	2.8	2.8	66.3

Thomaston	7.0	9.8	59.3
East Litchfield	7.2	17.0	52.1
Torrington	3.0	20.0	49.1
Norfolk	15.4	35.4	33.7
Canaan	7.7	43.1	36.0
Ashley Falls	2.2	45.3	33.8
Sheffield	4.1	49.4	19.7
Great Barrington	6.2	55.6	13.5
Stockbridge	7.5	63.1	6.0
Lenox	6.0	69.1	0.0

Lenox-Manchester, 65.2 Miles.

	Miles to	Out	Total Miles
		Return	
Lenox	0.0	0.0	65.2
Pittsfield	6.6	6.6	58.6
Lanesboro	5.3	11.9	53.3
S. Williamstown	11.4	23.3	41.9
Williamstown	5.4	28.7	36.5
Pownal Centre	4.6	33.3	31.9
Pownal	2.5	35.8	29.4
Bennington Cen- tre	6.3	42.1	23.1
S. Shaftsbury	5.1	47.2	18.0
Shaftsbury Cen- tre	3.6	50.8	14.4
Arlington	6.2	57.0	8.2
Manchester	8.2	65.2	0.0

Manchester-Sunapee Lake, 69.3 Miles.

	Miles to	Out	Total Miles
		Return	
Manchester	0.0	0.0	69.3
Peru	11.5	11.5	57.8
Londonderry	5.0	16.5	52.8
Simonville	7.4	23.9	45.4
Chester	6.7	30.6	38.7
Springfield	8.3	38.9	30.4
N. Charlestown	9.1	48.0	21.3
Claremont	5.4	53.4	15.9
Newport	9.8	63.2	6.1
Guild	2.6	65.8	3.5
Sunapee	3.5	69.3	0.0

Lake Sunapee-Profile House, 81.2 Miles.

	Miles to	Out	Total Miles
		Return	
Lake Sunapee	0.0	0.0	81.2
Georges Mills	2.9	2.9	78.3
New London	5.0	7.9	73.3
Elkins	3.0	10.9	70.3
Wilnot Flat	2.3	13.2	68.0
West Andover	3.1	16.3	64.9
Danbury	6.1	22.4	58.8
Bridgewater	14.1	36.5	44.7
East Hebron	4.9	41.4	39.8
Plymouth	8.8	50.2	31.0
West Campton	7.1	57.3	23.9
West Thornton	6.5	63.8	17.4
Woodstock	3.4	67.2	14.0
Profile House	14.0	81.2	0.0



Seashore at Kennebunkport, on Maine Coast.

Profile House-Bretton Woods-Crawford's Gap, 21.8 Miles.

	Miles to	Total Miles	Out Return
Profile House....	0.0	0.0	21.8
Twila Mountain House	13.4	13.4	8.4
Bretton Woods..	5.4	18.8	3.0
Mount Washington	0.6	19.4	2.4
Crawford Gap...	2.4	21.8	0.0

Bretton Woods-Poland Springs, 84.7 Miles.

	Miles to	Total Miles	Out Return
Bretton Woods..	0.0	0.0	84.7
Bartlett	18.6	18.6	66.1
Glen Station	6.1	24.7	60.0
Intervale	4.1	28.8	55.9
Redstone	5.0	33.8	50.9
Center Conway..	2.7	36.5	48.2
Fryeburg	4.6	41.1	43.6
East Fryeburg..	6.4	47.5	37.2
Bridgeton	9.2	56.7	28.0
Naples	9.1	65.8	18.9
Cooks Mills....	3.0	68.8	15.9
Webbs Mills....	4.5	73.3	11.4
Poland	8.1	81.4	3.3
Poland Springs..	3.3	84.7	0.0

Poland Springs-Newcastle, 84.8 Miles.

	Miles to	Total Miles	Out Return
Poland Springs..	0.0	0.0	84.8
Dry Mills	8.2	8.2	76.6
Gray	2.7	10.9	73.9
West Falmouth..	9.9	20.8	64.0
Allen's Corners..	3.2	24.0	60.8
Portland	3.7	27.7	57.1
Scarboro	5.7	33.4	51.4
Saco	8.6	42.0	42.8
Biddeford	0.9	42.9	41.9
Kennebunk	9.2	52.1	32.7
Wells	4.6	56.7	28.1
Ogunquit	5.5	62.2	22.6
Cape Neddick ..	3.3	65.5	19.3
York Beach	2.7	68.2	16.6
York Harbor	2.8	71.0	13.8
Kittery	8.2	79.2	5.6
Portsmouth	2.0	81.2	3.6
Newcastle	3.6	84.8	0.0

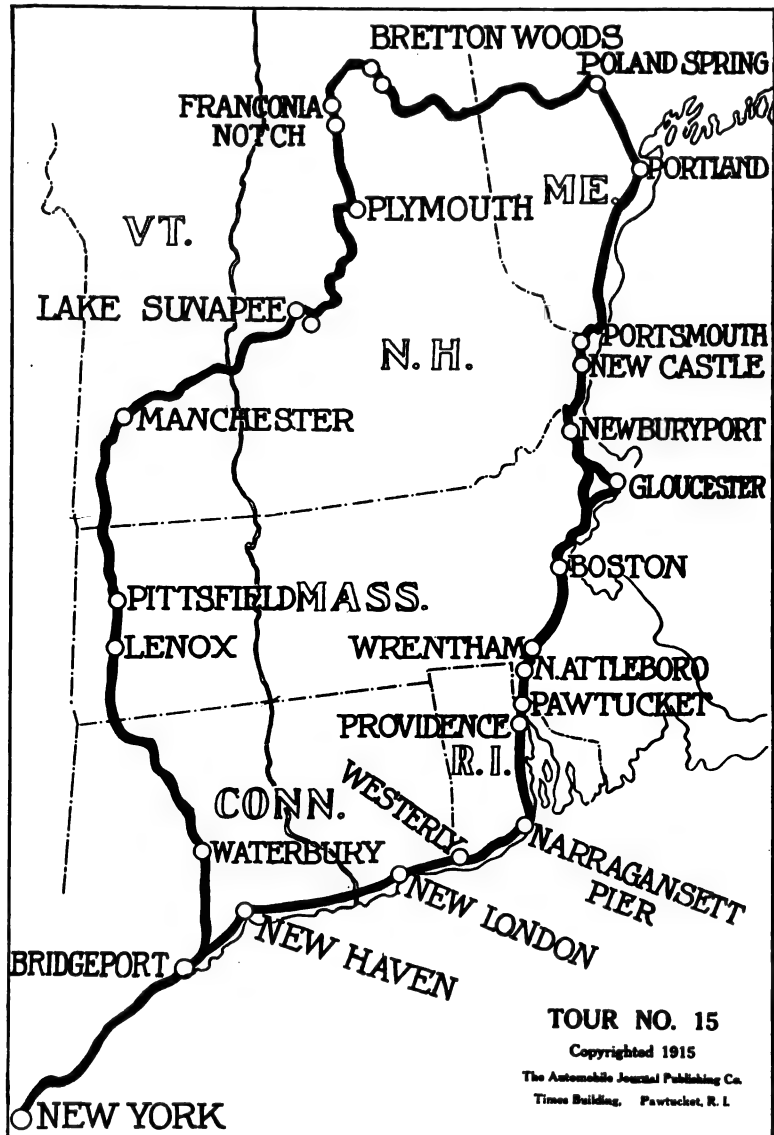
Newcastle-Boston, 89.1 Miles.

	Miles to	Total Miles	Out Return
Newcastle	0.0	0.0	89.1
Eaton's Corners..	19.7	19.7	69.4
Salisbury	3.9	23.6	65.5
Newburyport ..	2.6	26.2	62.9
Newburyport Old Town	3.7	29.9	59.2
Rowley	4.2	34.1	55.0
Ipswich	3.7	37.8	51.3
Essex	5.4	43.2	45.9
W. Gloucester..	3.6	46.8	42.3
Manchester-by-the-Sea	9.6	56.4	32.7
Beverly Farms..	2.7	59.1	30.0
Beverly	4.6	63.7	25.4
Salem	1.5	65.2	23.9
Swampscott	5.8	71.0	18.1
Lynn	1.9	72.9	16.2
Somerville	12.3	85.2	3.9
Boston	3.9	89.1	0.0

Boston-New London, 117.2 Miles.

	Miles to	Total Miles	Out Return
Boston	0.0	0.0	117.2
Dedham	10.8	10.8	106.4

Norwood	4.2	15.0	102.2	Flanders	6.3	6.3	122.2
Walpole	4.1	19.1	98.1	Lyme	9.6	15.9	112.6
Wrentham	6.9	26.0	91.2	Old Saybrook..	10.5	26.4	102.1
Plainville	4.8	30.8	86.4	Clinton	2.0	28.4	100.1
North Attleboro.	1.6	32.4	84.8	Madison	4.9	33.3	95.2
Pawtucket	8.0	40.4	76.8	Gulford	5.2	38.5	90.0
Providence	3.3	43.7	73.5	Branford	9.0	47.5	81.0
Apponaug	9.7	53.4	63.8	East Haven	3.3	50.8	77.7
E. Greenwich ..	2.6	56.0	61.2	New Haven	4.1	54.9	73.6
Hamilton	9.1	65.1	52.1	West Haven	3.6	58.5	70.0
Narragansett ..				Savin Rock	1.1	59.6	68.9
Pier	9.0	75.0	42.2	Woodmont	4.0	63.6	64.9



Wakefield Sta- tion	2.7	77.7	39.5	Milford	4.7	68.3	60.2
Westerly	21.4	99.1	18.1	Stratford	4.6	72.9	55.6
Mystic	9.2	108.3	8.9	Bridgeport	3.8	76.7	51.8
Noanck	2.6	110.9	6.3	Fairfield	4.5	81.2	47.3
Groton	6.2	117.1	0.1	Westport	1.6	82.8	45.7
New London	0.1	117.2	0.0	Norwalk	3.3	86.1	42.4
New London-New York, 128.5 Miles.				Darien	4.2	90.3	38.2
				Stamford	4.5	94.8	33.7
				Greenwich	5.1	99.9	28.6
				Portchester	3.1	103.0	25.5
				Rye	1.7	104.7	23.8
				Larchmont	5.3	110.0	18.5
				New Rochelle..	1.8	111.8	16.7
				New York	16.7	128.5	0.0

MAKE TOURING NOTES ON THIS PAGE

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

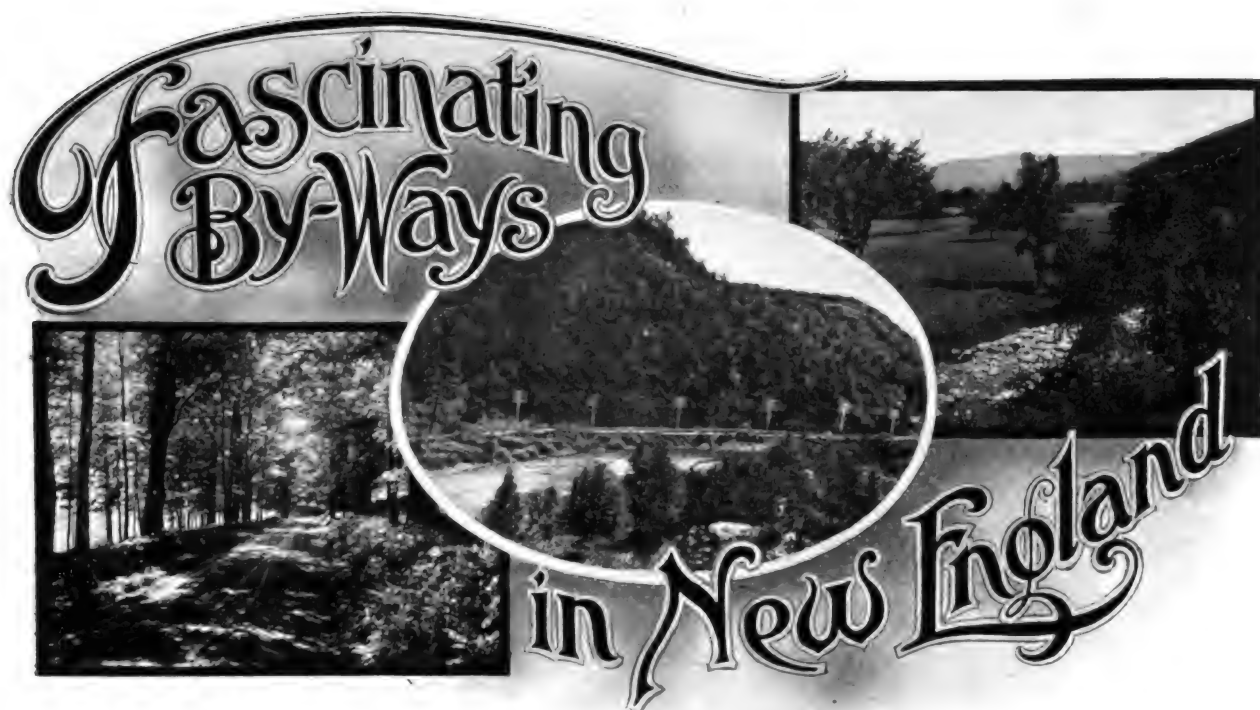
Memo

Date..... Place.....

Memo

Memo

Memo



Among Mountains, Forests and Lakes.

THE New England tour, which already has been described, follows the main and most heavily travelled routes to points of greatest popularity for motor tourists. It is the route most often followed by motorists who are making their first trip through this richly interesting country.

It does not by any means exhaust the possibilities. There are scores of spots sought for their beauty, their historic interest, or the possibilities they offer for sport which could not be included.

So this second and much longer New England tour, which as given will require 22 days running, has been drawn up. It meets and crosses the route of tour No. 15 frequently, so that it is possible to combine the two in any way that the tourist may desire, and it is also possible to omit many parts if that is desired.

If taken in its entirety it will be found to provide some new interest in every day's run and to include practically every attraction for which New England tours have become justly famous.

It takes the tourist up the Hud-

son, into the Berkshires, to Lake Champlain, to the White mountains, to the Maine woods and the New Hampshire lakes, to the Maine coast at Bar Harbor, and to the wild and very interesting country on the Bay of Fundy, in New Brunswick. It covers Cape Cod and Plymouth, Mass., the most historic of New England sections, touches Newport, R. I., the social capital, and passes through many New England industrial centres.

Those tourists who have been through New England once or twice and are familiar with its more obvious attractions, will find that this route brings them to much that they have not yet seen.

The tourist leaves New York and proceeds up the Hudson valley, through Yonkers, where Washington courted Mary Phillip-sie, who was afterwards charged with treason, and Dobbs ferry, where he made his headquarters in 1781. This country was made famous by the work of Washington Irving, who lies in a church yard at Tarrytown, where there is also a monument dealing with the

capture and execution of Major Andre. John D. Rockefeller's estate at Pocantico Hills is also passed. The first leg of the run is to Hudson, midway between Poughkeepsie and Albany, where a turn is made to the east through the famous Berkshire hills to Pittsfield, in the heart of the Berkshires.

Thence the road lies north through Manchester, a town with many attractions as a summer resort, to Rutland, the centre of the quarrying industry of Vermont—a district that supplies the United States with most of its marble—to Burlington. At Pittsford is the largest quarry in the United States. In a nearby gorge there is ice that never melts even in midsummer. Near Salisbury the tourist passes along the shore of Lake Dumore, a sparkling Green mountain lake of great beauty. The Green mountain scenery is very fine. Burlington, at the end of the run, is on Lake Champlain, a lake noted in revolutionary history. It is one of the finest lakes in the country for vacation purposes.



A Vista in the Berkshires.

Ethan Allan, the hero of Fort Ticonderoga, is buried in Greenmount cemetery, Burlington, and his name is kept fresh in the memory of the town by Ethan Allen park. Vermont university, of which the first corner stone was laid by Lafayette in 1825, is ranged about a most attractive campus. Battery park covers the site of the battery that protected the town from the British in 1812. Fort Ethan Allen, a United States cavalry post, is four miles away.

The road runs out to the north-east to Newport, Vt., at the end of Lake Memphremagog, and just south of the Canadian border—a country with many opportunities for fishing. Thence the tourist goes south through St. Johnsbury to Bretton Woods, the heart of the White mountains, where he may visit Mount Washington.

Through the valley of the Connecticut river the road now runs north. At Groveton, the foothills of the White mountains are left behind. At Colebrook the road leaves the Connecticut river and shortly strikes the Mohawk, which it follows through the industrial town of Dixville to the Dixville Notch.

The notch itself is not a mountain pass, but a ravine through very high hills. It has high, columnar sides, encasing a narrow chasm. The cliffs are of decaying mica slate and they present a scene of transition, ruin and shattered strength. There is a flume in the notch, cascades, a

snow cave and a spring of the purest water that issues from the earth anywhere.

The run from Dixville to the Rangeley lakes passes several lakes of remarkable beauty, all of which are excellent fishing grounds. These lakes were named by the Indians. They include Mollychunkamunk, Allagundabagog, Wellocksebacook and Umbagog.

Between Dixville and Errol the road passes the Table Rock. This is reached from the highway by a

rough stairway of stone blocks, which has been named Jacob's ladder. The top of the rock is 560 feet above the road and 2450 feet above sea level. It tapers down to a width of only about eight feet at the top. The view obtainable here of the surrounding country is worth great effort to enjoy.

At Newry the road strikes the direct route from Bretton Woods to Rangeley lakes. There are five of these lakes and they cover an area of 90 square miles. All are connected by narrows and creeks, so that they form a continuous waterway 56 miles long. The lake furthest east, which is now generally known as Rangeley, but which was formerly referred to as Oquossoc, is the finest of the chain. It is 2000 feet above sea level. Across the outlet is Bald Head, an exceptionally climbable mountain.

Fishing on these lakes is of the finest. So large are most of the fish that trout weighing less than three pounds are habitually returned. The water is as clear as crystal. The other lakes of the chain are known as Mooselucmaguntic, Cupsuptic, Molechunkamunk and Wolokennebacook. Together they form the source of the Androscoggin river which, on its way to the sea, turns the wheels of hundreds of factories.



Ruins of Fort Ticonderoga.

From Rangeley to Moosehead, an even greater fishing ground, the road runs through a sparsely settled country heavily wooded—the great Maine woods, so much beloved by hunters. These roads range from fair to good and except in wet weather there should be no difficulty whatever in traversing them.

The station on Moosehead lake is Greenville Junction, where a large, new garage has been constructed to take care of the cars of tourists. A small steamer runs to Kineo, where there is a very fine hotel near the base of Mount Kineo. Moosehead lake is 40 miles

above the level of the lake and whose western slope runs off into the water in the shape of a level, green clad peninsula.

There is a pebble beach formed of pieces of stone of various colors broken from the mountain by the action of the ice and worn smooth and round by years of grinding on the shore. The lake is the source of the Kennebec river.

From Greenville Junction the road goes over excellent gravel to Bangor, at the head of navigation on Penobscot river, and at its junction with the Kenduskeag. It is said that Champlain ascended the Penobscot to the site of Ban-

pine Islands, in Frenchman's bay, and takes in the Rolling hills of Goldsboro. There are fine beaches near the town. Cromwell's cove is a mile and a half from the village. It has bold cliff shores, on one of which is a strange rock figure called "The Assyrian." "The Indian's Foot," a footprint in the rock, and the "Pulpit," are in this vicinity. Four miles south of Bar Harbor, on the island shore, is Schooner Head, a cliff so much resembling a schooner under sail that it is said to have been bombarded by a British frigate in 1812. The Spouting Horn is a passage worn in the cliff through



Owl's Head on Lake Memphremagog, Newport, Vt.

long and from two to 18 miles wide. It has always contained a limitless quantity of fish, which does not seem to have been much diminished by the fishing of the thousands of pleasure seekers who have visited it during the past 30 years. It is said to be the largest and best fishing ground in America. Here also deer and moose abound and during the season this is the headquarters of hunters.

The lake is surrounded by high hills, deeply wooded, with here and there a bare mountain top extending above the line of green. The largest of these is Mt. Kineo, whose bare face looms 1000 feet

gor in 1608, but the place was not settled until 1769.

Through Bangor the road goes to Ellsworth, where it crosses to Mt. Desert Island, on which the famous summer resort of Bar Harbor is located. Mt. Desert has been compared with Rio Janeiro for the beauty of its scenery and the splendid combination of mountains and sea. On this island are 13 peaks, interspersed with many beautiful lakes, while a deep arm of the sea runs through the island to the north, nearly cutting it in two.

The view from the village of Bar Harbor includes the Porcu-

which the seas sweep in rough weather and form a fountain above. The Ovens are a series of strange and interesting caves on the porphyritic cliffs of Salisbury cove. Nine miles southwest of Bar Harbor, on a road leading through Echo Notch, is a beautiful lake, surrounded by Sargent's mountain, Mt. Pemetic and the Bubble mountains. The view is a wonderful combination of mountain waters and mountain cliffs. The lake is two miles long by a half mile wide and is known as Jordan's pond.

Mt. Desert Island was granted by the King of France in 1688 to



The Winooski River in Vermont.

Condillac, a Gascon noble, and his granddaughter, Madame Marie Therese de Gregoire lived there from 1785 to 1810. The roads of this remarkable island have been closed to automobiles until this year, but recent action by the Maine legislature and the inhabitants of the three towns on the island have now opened it for the first time to motor traffic.

From Bar Harbor the tourist rolls northeast along the shore of the Atlantic to Calais, Me., immediately opposite St. Stephens, New Brunswick. The Atlantic here sends off many sharp bays and the road lies along the extremities of these bays, so that through the country between them it is well back from the coast. The land is rolling and very picturesque. The road is good dirt surface and will give no special difficulty.

The tour as planned goes on from St. Stephen and Calais to St. John, N. B. On crossing the Canadian border it is necessary to make arrangements regarding bonds assuring the Canadians customs officials that the car will leave the dominion after a short period. Chauffeurs are required to take out a New Brunswick license.

The road to St. Johns is a good dirt highway through a rolling, picturesque country along the shore line. It is sparsely settled and there are practically no accommodations available anywhere on the day's run except at St. An-

draws and St. George.

St. John is the largest city in New Brunswick. It is situated on a rocky promontory between the St. John river and Courtenay bay. Its situation on the hills renders it very picturesque. There is a suspension bridge to the heights of Carleton, from which a fine view of St. Johns falls is obtainable. Down these at low tide the river tumbles on its way to sea. At high tide there is presented the unusual sight of the river falling up stream, for the terrific tides of the Bay of Fundy rush up it several feet high and pour furiously over

the rocks. The water front of the city, which is a fishing centre of much importance, is very well worth a visit.

Beyond St. John the road leads to Moncton. The going is very good. The road follows the valley of the Petitcodiac river, which is famous the world over for its abnormal tides. These tides rush up the river in tidal waves of from three to seven feet in height. This is an extremely interesting phenomenon. The trip in fact supplies river and hill scenery, which cannot be duplicated anywhere else.

Beyond Moncton to Chatham, at the head of Mirimichi bay, off the gulf of St. Lawrence, the roads are of poorer quality and the country is wild. Yet the route is quite passable in dry weather, but after heavy rains it should not be attempted. From Chatham another day's run over very similar roads, although removed from the coast and through a wild country of woods and lakes, leads to Fred-ricton.

This town was first settled in 1692 by Governor Villebon. It became the capital of the province of New Brunswick in 1788, having been chosen because St. John was more easily attacked and partly because it was desired to encourage the settlement of the interior of the province. The town is the seat of the University of New Brunswick, founded in 1825, and of a cavalry school.

The next day takes the tourist



View in the Flume at Dixville Notch in New Hampshire.



View of Mooshead Lake from the Base of Mt. Kincaid.

through Woodstock to Houlton, Me. Houlton is the metropolis of Aroostook county, Maine. Until lately the chief product of the district has been lumber, as the high latitude sets severe limits to the agricultural development of the country. It is possible, however, to grow very fine potatoes there, and they have been produced in great quantity. Houlton is the chief marketing place for this product.

Roads throughout this part of Maine have been improving rapidly. There are many motor cars owned in the country and the tourist, who would have found it a very difficult section only a short time ago, can now get about—often travelling through the dense woods—without difficulty.

Out of Houlton the road runs through the heart of the woods, passing many busy saw mills and crossing rivers that tumble down their rough beds and over beautiful falls on their way to the Atlantic ocean. The road passes Mt. Katahdin, of volcanic origin. From its rugged top can be seen most of the lakes and mountains of northern Maine, spread out below. This mountain is in the centre of the best Moose country in the state, and it is a peak about which very little has been generally known until the automobile opened up the roads in this section of the state.

A series of lively lumbering towns punctuate the route. These include Mattawamkeag, Lincoln,

Winn, Passadumkeag, Olamon and Costigan. But the most important place of this sort is Old Town, not very far from Bangor. This is on the Penobscot river, which is usually found to be full of huge booms of logs, which are floated down from the Moosehead lake region to the mills. Old Town is said to be the location of the largest lumber mill in the world. In this building 100 saws are operated to cut the logs into planks, which are then sent down the river in rafts to Bangor.

On an island near Old Town is the reservation of the Tarratine Indians, one of the three tribes of

the Etchimin nation. Although they are the most powerful and warlike of the northern tribes, the Tarratines rarely attacked the colonists. When they were finally aroused, however, their fury had terrible results and they secured control of the State of Maine by the treaty of Casco.

This treaty, signed in 1726, contains the substance of the arrangement by which their relations to the state are still regulated. They own the islands in the Penobscot and receive \$7000 a year from the state. Between Old Town and Bangor, the road passes through Orono, the seat of the University of Maine. Set in the fields some distance from the town the old buildings of this institution present a picture of great beauty.

At Hampden, below Bangor, the British attacked in 1812 and plundered and over ran the town for three days. Between Winterport and Frankfort are many stone quarries about the base of Mt. Waldo. Belfast is a pretty little city with wide, shady streets, that slope to the banks of the Penobscot river.

For a time the route passes along Penobscot Bay and Mt. Desert can again be seen in the distance. Camden is a picturesque town, surrounded by a group of mountains, in which the two Meguntook peaks are included. There are many hills along the road through Rockport and Rock-



Road Builders on Moosac Mountain.



Mt. Katahdin, Maine's Highest Peak, as Seen from Kidney Pond.

land. Rockland is situated on Owl's Head bay. Ship building is one of the leading industries of the town, but lime burning is equally important. At night the kilns, throwing their red glare on the sky, add marvelously to the picturesque beauty of the scene.

Thomaston is located on a deep, narrow harbor, and here is the Maine state's prison, which was founded in 1824. The original fort was built in 1720. It was garrisoned and equipped with cannon by the colony of Massachusetts. In 1722 it was furiously attacked by the Tarratine Indians, and the assault, led by French monks, was disastrously repulsed. The attacking party then undertook to dig a mine, but did it so unskillfully that it caved in and they were forced to retire in great confusion. In 1723 it was again

besieged for 30 days and in 1724 a fleet of 22 captured fishing vessels put in to give battle. These attacked the colonial relief ships and worsted them, but did not take the fort, which stood until the Revolutionary war, when it was demolished by the British.

Damariscotta and Newcastle, on opposite sides of the Damariscotta river, were settled about 1640. A considerable settlement was made in Newcastle at that time, of which traces were until recently to be seen, but no records of the settlement were preserved and history is ignorant of happenings there. It was probably destroyed by the French. It was rebuilt and again destroyed in King Phillip's war, and a third time it was destroyed in 1688 and for 30 years it lay desolate. Damariscotta was many times assailed by the In-

dians and it, too, was abandoned two or three times.

Wiscasset was a bustling maritime town in the early days of American supremacy on the seas. Its most prosperous period ran from the Revolutionary war until about 1806. It has a broad and spacious harbor. The embargo acts and the War of 1812 ruined its trade and what had promised to become a great city is now only a pleasant village, fading rapidly from the hills.

Another interesting town is Woolwich, on the Kennebec river. It was settled in 1638, depopulated by Indian attack in 1676, and again resettled. It was named Woolwich because of a resemblance of the Kennebec river at this point to the English Thames at Woolwich.

Bath is another town of glorious past. It is situated on the Kennebec river, 12 miles from the sea. It was a town of great importance and wealth during the period of American maritime dominance. Shipbuilding began there in 1762 and was greatly favored by the ease with which the best ship timber was floated down the river from the great forests of the interior. The harbor is excellent. The town is only a half mile wide and several miles long, extending along the west bank of the river. The site was first visited by Captain Weymouth in 1605. It was bought from the Indian chief, Robin Hood, and some buildings erected in 1660, but its growth was very slow until the Revolutionary war.

The night stop is Portland, the metropolis of Maine. The next day's run is from Portland, Me.,



Inspiring Shore Scene Near Scarborough, Me.



One of the Fishing Lakes in Eastern Maine.



View of Spencer Mountain from Lobster Lake in Central Maine.

to Concord, N. H., along the coast, through Kennebunk, settled in 1602, with a long history of Indian troubles, to Wells, not far from Portsmouth, N. H., where it turns inland to Dover and goes straight west to Concord, the capital of New Hampshire.

Concord was settled in 1725 under a grant from Massachusetts and was named Rumford at that time. Eight years later it became a part of New Hampshire, to the great regret of the inhabitants, who petitioned the King to be permitted to remain in the State of Massachusetts. At the outbreak of the war with France seven timber forts were built and the 96 men of the town, with their families, lived for months in a state of siege.

South from Concord the route goes through Acton and Nashua. This latter city is located at the confluence of the Merrimac and the Nashua rivers. It was not settled until well into the 19th century, and did not become a town of any consequence until manufacturing began to develop.

Wrentham is the home of Helen Keller. Much of her life has been spent there and although she has never seen the beautiful drives and walks in the vicinity, they are very dear to her. Lake Pearl is becoming popular as a summer resort for Boston and Providence people. North Attleboro is chiefly notable for the large jewelry manufacturing establishments which are located there.

Pawtucket is another manufacturing town. Its many large factories are devoted chiefly to textile trades, although many other lines are represented. It was the scene of the destruction of Captain Pierce and 70 men in 1676. They were attacked near the shore of the Blackstone river. The first cotton mill in the United States was built in Pawtucket and is still standing near the falls, over which a bridge takes the tourist into the centre of the town.

Providence was settled by Roger Williams after he had been driven by religious prejudice from Salem. The city abounds with memorials to him and his body rests in North cemetery. Among the points of interest are the old

and new state houses, the First Baptist church, founded by Roger Williams, Roger Williams park, the Athenaeum and Brown university.

Out of Providence the road passes through Fall River to New Bedford, on the southern shore of Cape Cod, and then crosses the cape to Sagamore. The towns along here, Onset, Sagamore, Barnstable and Yarmouth port, have supplied countless sailors to the old American merchant marine. The road goes along the shore of Buzzard's bay, passing the summer home of the late President Cleveland. Fairhaven was the summer home of H. H. Rogers, late president of the Standard Oil Company. For many years he was superintendent of streets there and the fine roads in and about the town were very largely a gift from him to the town.

Both New Bedford and Fall River are large commercial towns. The former was for many years the home port of a large whaling fleet. Fall River is now the terminus of a prosperous line of Long Island sound steamers operating to New York City.

Through the villages of Dennis, East Dennis, Brewster, Orleans, Eastham, Wellfleet, Truro to Provincetown, on the extreme end of the cape, the road passes a district peopled by quaint maritime folk, whose sturdy peculiarities have formed the theme of much excellent American literature.

Leaving Provincetown the next day the tourist goes down the eastern edge of the cape, through



Newport Beach, Now Operated as a Municipal Summer Shore Resort.

many more maritime towns and across the south side to New Bedford and from there to Newport. The city is most famous to the readers of the Sunday newspapers as the site of the summer homes of many of New York's very wealthy families.

Newport is reached by way of Tiverton, crossing the island of Rhode Island. The cliff walk leading for many miles along the shore and traversing many of the great estates, is of much interest. But in addition to the social position of its inhabitants, Newport is interesting in a historical way. There is an old stone mill here, which was found when the earliest settlers cleared away the woods to make a home for themselves.

Around this figure are others of Morality, Law, Education and Freedom, and below these are marble reliefs, picturing scenes in early American history.

Some of the oldest houses in the United States stand in the town. They include the Leach house 1679, Howland house 1666, Cole's blacksmith shop 1684, Crowe house 1664, Harlow house 1667. Pilgrim hall is a museum of early colonial relics. In it are the commission from Oliver Cromwell to Governor Wilson, the chairs of Brewster and Governor Carver, Miles Standish's famous Damascus sword, said to date back two or three decades before the Christian era and brought to England doubtless from the Crusades. There is also on display the gun

American military.

The last day of the tour runs from Springfield through Hartford, Waterbury, Danbury to New York City. Hartford was the site of a two-gun fort, built by the Dutch in 1633, which was called the "Hirse of Good Hope." In June, 1636, Thomas Hooker led his church into the settlement from Newtown. Mills were built on the Park river and grain was brought in from all the surrounding country to be ground. The town organized its fighting forces early and seems never to have been over run by the Indians, who held its people in such respect that some of the chiefs paid them tribute in return for protection from some of their Indian enemies.



View of Southington Mountain, Near Waterbury, Conn., with Hanging Hills of Meriden in the Distance.

This is supposed to have been the work of Eric the Red and the Norsemen, who landed on the coast about the year 1000. A United States naval training station and torpedo station are also located at Newport.

From Newport the next day's run leads via Taunton, Mass., to Plymouth, where the Pilgrims first landed. Off the town in 1620 the Mayflower cast anchor. A rock supposed to be the one upon which the first Pilgrim set foot has been preserved and is now to be seen on the shore with a canopy erected over it. A great monument has also been erected on the spot "by a Grateful People in Remembrance of Their Labors, Sacrifices and Sufferings for the Cause of Civil and Religious Liberty." The principal figure is a huge statue of Faith, 36 feet high.

barrel that killed King Phillip, the redoubtable Indian chief. There is a copy of the oldest state paper in the United States and a copy of Elliott's Indian Bible.

The next day's run goes west through Taunton, Worcester and to Springfield. It passes through Brockton, a centre of the shoe manufacturing trade, and most of the cities are of a strongly industrial character. Worcester is situated among the hills of Blackstone valley, and its many industries have been greatly aided by the fact that it has long been a leading New England railroad centre. It has also been remarkable for its many schools, colleges, seminaries and academies.

Springfield is the site of the old United States armory, where were produced the famous Springfield rifles used for so long by the

Hartford is the capital of Connecticut and a very large and prosperous industrial town.

Waterbury is built at the junction of the Mad and the Naugatuck rivers. It is chiefly notable as an industrial town, though it has many fine residences and pleasant streets. Danbury is a manufacturing city which has long been the centre of hat trade in the United States. The country beyond Danbury takes on a suburban character as New York City is approached.

ITINERARY NO. 16.

Night Stops—New York, Pittsfield, Mass.; Burlington, Vt.; Bretton Woods, Dixville, N. H.; Rangeley, Moosehead

Jeffersonville	2.6	28.8	132.2
Johnson	8.9	37.7	123.3
North Hyde Park	5.5	43.2	117.8
Eden	4.0	47.2	113.8
Westfield	16.5	63.7	97.3
Troy	2.0	65.7	95.3
Newport	10.5	76.2	84.8
West Derby	1.2	77.4	83.6
Derby	3.4	80.8	80.2
West Charleston	5.5	86.3	74.7
Westmore	10.7	97.0	64.0
West Burke	10.1	107.1	53.9
Lyndon Center	8.3	115.4	45.6

St. Johnsbury			
Centre	6.2	121.6	39.4
St. Johnsbury	2.8	124.4	36.6
Lower Waterford	9.6	134.0	27.0
Waterford	3.1	137.1	23.9
Littleton	5.4	142.5	18.5
Bethlehem	4.9	147.4	13.6
Bethlehem Jet.	3.1	150.5	10.5
Bretton Woods	10.5	161.0	0.0

Bretton Woods-Dixville Notch, 69.7 Miles.

	Miles to	Total Miles	Out Return
Bretton Woods	0.0	0.0	69.7

Ridgelyville	1.9	61.0	48.8
Dixfield	4.4	65.4	44.4
Weld	12.1	77.5	32.3
Webb	2.3	79.8	30.0
Madrid	14.8	94.6	15.2
Rangeley, Me.	15.2	109.8	0.0

Rangeley-Moosehead Lake, 133.7 Miles.

	Miles to	Total Miles	Out Return
Rangeley	0.0	0.0	133.7
Dead River Station	4.5	4.5	129.2
Stratton	15.3	19.8	113.9
North New Portland	37.1	56.9	76.8
North Anson	8.3	65.2	68.5
Lakewood	6.8	72.0	61.7
Skowhegan	5.7	77.7	56.0
N. Cornville	10.7	88.4	45.3
Athens	2.0	90.4	43.3
Brighton	8.6	99.0	34.7
Kingsbury	5.9	104.9	28.8
Blanchard	12.8	117.7	16.0



An Old Road Through the Berkshires.

Twin Mountain			
House	5.4	5.4	64.3
Whitefield	8.6	14.0	55.7
Lancaster	8.5	22.5	47.2
Coos Junction	1.4	23.9	45.8
Groveton, N. H.	8.7	32.6	37.1
Stratford Hollow	5.0	37.6	32.1
North Stratford	8.5	46.1	23.6
Colebrook	13.2	59.3	10.4
Kidderville	6.7	66.0	3.7
Dixville Notch	3.7	69.7	0.0

Dixville Notch-Rangeley, 109.8 Miles.

	Miles to	Total Miles	Out Return
Dixville Notch	0.0	0.0	109.8
Errol	11.8	11.8	98.0
Upton, Me.	9.6	21.4	88.4
Newry	21.1	42.5	67.3
Hanover	5.2	47.7	62.1
Rumford Point	1.7	49.4	60.4
Rumford Center	4.3	53.7	56.1
Rumford	5.4	59.1	50.7

Greenville	14.6	132.3	1.4
Greenville Jet.	1.4	133.7	0.0

Moosehead Lake-Bar Harbor, 109 Miles.

	Miles to	Total Miles	Out Return
Greenville Jet.	0.0	0.0	109.0
Greenville	1.6	1.6	107.4
Monson	13.5	15.1	93.9
Abbott	6.1	21.2	87.8
Gulford	5.2	26.4	82.6
Dover	8.0	34.4	74.6
West Charleston	11.7	46.1	62.9
East Corinth	5.0	51.1	57.9
Kenduskeag	8.0	59.1	49.9
Bangor	14.0	73.1	35.9
Brewer	0.7	73.8	35.2
E. Orrington	5.8	79.6	29.4
North Ellsworth	12.8	92.4	16.6
Ellsworth Falls	6.0	98.4	10.6
Ellsworth	1.7	100.1	8.9
Mt. Desert Island (Bar Harbor)	8.9	109.0	0.0

Bar Harbor-St. Stephen, 114.9 Miles.

	Miles to	Total Miles	Out Return
Bar Harbor	0.0	0.0	114.9
Ellsworth	8.9	8.9	106.0
Hancock	10.0	18.9	96.0
West Sullivan			
Ferry	1.1	20.0	94.9
West Sullivan	0.2	20.2	94.7
Sullivan	1.7	21.9	93.0
East Sullivan	2.7	24.6	90.3
Gouldsboro	6.9	31.5	83.4
Steuben	4.9	36.4	78.5
Millbridge	5.6	42.0	72.9
Harrington	7.7	49.7	65.2
Columbia Falls	4.9	54.6	60.3
Jonesboro	8.2	62.8	52.1
Machias	7.7	70.5	44.4
East Machias	4.3	74.8	40.1
Baring	34.6	109.4	5.5
Milltown	3.2	112.6	2.3
Calais, Me.	1.6	114.2	0.7
St. Stephen, N. H.	0.7	114.9	0.0

Calais-St. Stephens-St. John, 83.7 Miles.

	Miles to	Total Miles	Out Return
Calais	0.0	0.0	83.7
Oak Bay	6.7	6.7	77.0
St. Andrews	13.6	20.3	63.4
St. George	19.3	39.6	44.1
Lepreaux	18.0	57.6	26.1
Musquash	8.7	66.3	17.4
Spruce Lake	9.5	75.8	7.9
Fairville	5.0	80.8	2.9
St. John	2.9	83.7	0.0

St. John-Moncton, 95.9 Miles.

	Miles to	Total Miles	Out Return
St. John	0.0	0.0	95.9
One Mile House	1.5	1.5	94.4
Rothsay	7.4	8.9	87.0
Hampton Station	13.5	22.4	73.5
Sussex	22.8	45.2	59.7
Petitcodiac	26.0	71.2	24.7
River Glade	5.2	76.4	19.5
Salisbury	5.4	81.8	14.1
Moncton	14.1	95.9	0.0

Moncton-Chatham, 88 Miles.

	Miles to	Total Miles	Out Return
Moncton	0.0	0.0	88.0
Cocagne	22.3	22.3	65.7
Bucktonche	11.0	33.3	54.7
Rexton	14.7	48.0	40.0
Richibucto	2.6	50.6	37.4
Chatham	37.4	88.0	0.0

Chatham-Fredrickton, 105.8 Miles.

	Miles to	Total Miles	Out Return
Chatham	0.0	0.0	105.8
Newcastle Ferry	4.6	4.6	101.2
Derby Jet.	3.6	8.2	97.6
Millerton	4.4	12.6	93.2
Blackville	15.6	28.2	77.6
Doaktown	21.4	49.6	56.2
Bolestown	15.4	65.0	40.8
Covered Bridge	18.0	83.0	22.8
Nashuaak	9.5	92.5	13.3
Marysville	9.3	101.8	4.0
Fredrickton, N. B.	4.0	105.8	0.0

Fredrickton-Houlton, 79.7 Miles.

	Miles to	Total Miles	Out Return
Frederickton	0.0	0.0	79.7
Long	16.9	16.9	62.8
Prince William	5.4	22.3	57.4
Hawshaw	15.4	37.7	42.0
Temple	19.2	56.9	22.8

Woodstock, N. B. 7.0 63.9 15.8
 Richmond Cor-
 ners 6.7 70.6 9.1
 Houlton, Me. 9.1 79.7 0.0
Houlton-Bangor, 116.2 Miles

	Miles to	Total Miles	Out Return
Houlton	0.0	0.0	116.2
Linneus	8.6	8.6	107.6
Haynesville	16.0	24.6	91.6
Macwahoc	19.5	44.1	72.1
Matawamkeag	9.7	53.8	62.4
Lincoln	13.8	67.6	48.6
S. Lincoln	5.3	72.9	43.3
W. Enfield	6.6	79.5	36.7
Passadumkeag	4.9	84.4	31.8
Olamon	4.5	88.9	27.3
Costigan	8.9	97.8	18.4
Old Town	5.7	103.5	12.7
Orono	4.9	108.4	7.8
Bangor	7.8	116.2	0.0

Bangor-Portland, 140.8 Miles.

	Miles to	Total Miles	Out Return
Bangor	0.0	0.0	140.8
Hampden	6.0	6.0	134.8
Winterport	7.0	13.0	127.8
Frankfort	2.8	15.8	125.0

Biddeford	0.9	15.2	71.2
Kennebunk	9.2	24.4	62.0
Wells	4.6	29.0	57.4
North Berwick	9.0	38.0	48.4
S. Berwick, Me.	6.4	44.4	42.0
Dover, N. H.	4.3	48.7	37.7
Barrington	9.8	58.5	27.9
E. Northwood	6.1	64.6	21.8
Northwood Cen- ter	3.6	68.2	18.2
Epsom	7.4	75.6	10.8
Gossville	0.6	76.2	10.2
Concord	10.2	86.4	0.0

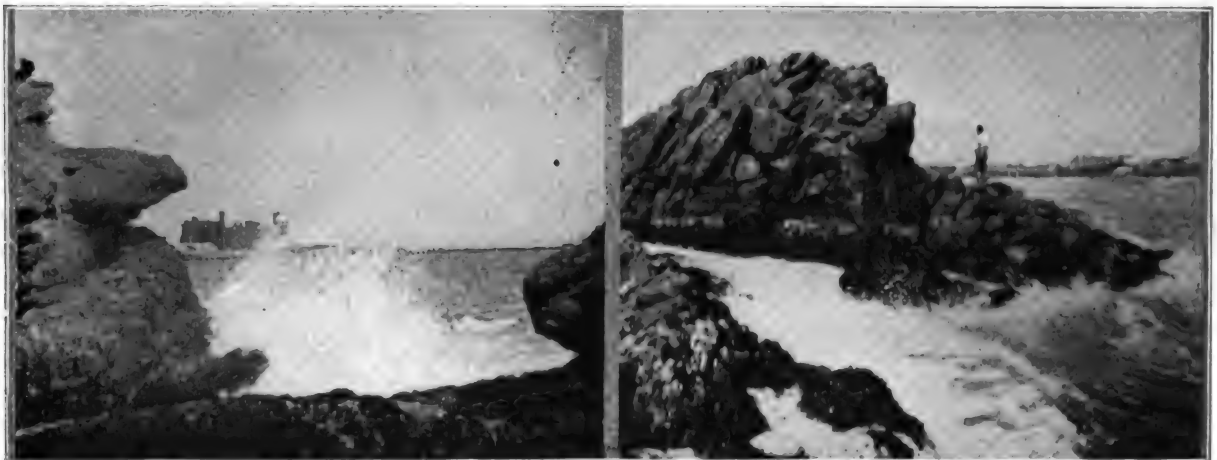
Concord-Providence, 120 Miles.

	Miles to	Total Miles	Out Return
Concord	0.0	0.0	120.0
Pembroke	5.8	5.8	114.2
Suncook	1.5	7.3	112.7
Manchester	10.7	18.0	112.0
Merrimack	8.7	26.7	93.3
Thornton's Ferry	3.5	30.2	89.8
Nashua, N. H.	5.9	36.1	83.9
Tyngsboro, Mass.	6.4	42.5	77.5
Chelmsford	6.5	49.0	71.0
North Acton	8.7	57.7	62.3
Sudbury	13.3	71.0	49.0

Onset	3.8	54.3	68.6
Sagamore	8.9	63.2	59.7
Sandwich	2.0	65.2	57.7
W. Barnstable	7.7	72.9	50.0
Barnstable	3.1	76.0	46.9
Yarmouth Port	3.0	79.0	43.9
Dennis	4.5	83.5	39.4
E. Dennis	2.0	85.5	37.4
Brewster	4.6	90.1	32.8
Orleans	5.4	95.5	27.4
Eastham	3.9	99.4	23.5
S. Wellfleet	6.6	106.0	16.9
Wellfleet	2.3	108.3	14.6
Truro	4.7	113.0	9.9
Provincetown	9.9	122.9	0.0

Provincetown-Newport (via Chatham), 148.4 Miles.

	Miles to	Total Miles	Out Return
Provincetown	0.0	0.0	148.4
N. Truro	6.3	6.3	142.1
Wellfleet	8.2	14.5	133.9
Eastham	9.0	23.5	124.9
Orleans	3.5	27.0	121.4
Chatham	9.6	36.6	111.8
South Harwich	5.2	41.8	106.6
West Dennis	7.1	48.9	99.5
S. Yarmouth	0.8	49.7	98.7



Two Views of Surf from Cliff Walk at Newport, R. I.: Oehre Point at Left; Brenton Point at Right.

Prospect	4.1	19.9	120.9
Searsport	9.0	28.9	111.9
Belfast	5.4	34.3	106.5
Northport	7.8	42.1	98.7
Lincolntonville	5.1	47.2	93.5
Camden	5.6	52.8	88.0
Rockport	1.9	54.7	86.1
Rockland	6.2	60.9	79.9
Thomaston	4.1	65.0	75.8
West Warren	5.1	70.1	70.7
Waldoboro	6.6	76.7	64.1
Damariscotta	10.5	87.2	53.6
New Castle	0.3	87.5	53.3
Wiscasset	8.7	96.2	44.6
Mont Sweag	4.3	100.5	40.3
Woolwich	5.2	105.7	35.1
Bath	0.0	105.7	35.1
Brunswick	9.1	114.8	26.0
Freeport	8.5	123.3	17.5
Yarmouth	5.7	129.0	11.8
Falmouth Fore- side	5.4	134.4	6.4
Portland	6.4	140.8	0.0

Portland-Concord, 86.4 Miles.

	Miles to	Total Miles	Out Return
Portland	0.0	0.0	86.4
Scarboro	5.7	5.7	80.7
Saco	8.6	14.3	72.1

East Sudbury	2.0	73.0	47.0
Saxtonville	3.2	76.2	43.8
South Framing- ham	3.7	79.9	40.1
Sherborn	4.0	83.9	36.1
Medfield	6.1	90.0	30.0
Walpole	4.4	94.4	25.6
Wrentham	6.9	101.3	18.7
North Attleboro, Mass.	6.4	107.7	12.3
Pawtucket, R. I.	8.0	115.7	4.3
Providence	4.3	120.0	0.0

Providence-Provincetown, 122.9 Miles.

	Miles to	Total Miles	Out Return
Providence	0.0	0.0	122.9
Seekonk, Mass.	4.5	4.5	118.4
Luther's Corners	8.3	12.8	110.1
Swansea	2.1	14.9	108.0
Fall River	4.6	19.5	103.4
Westport Fac- tory	6.9	26.4	96.5
New Bedford	6.3	32.7	90.2
Fairhaven	1.9	34.6	88.3
Mattapoisett	5.1	39.7	83.2
Marion	5.0	44.7	78.2
Wareham	5.8	50.5	72.4

Hyannis	5.1	54.8	93.6
Centerville	4.1	58.9	89.5
Osterville	3.1	62.0	86.4
Marston's Mills	2.3	64.3	84.1
East Falmouth	10.0	74.3	74.1
Falmouth	4.2	78.5	69.9
N. Falmouth	7.3	85.8	62.6
Monument Beach	5.6	91.4	57.0
Onset	6.2	97.6	50.8
Wareham	3.8	101.4	47.0
Marion	5.8	107.2	41.2
Mattapoisett	5.0	112.2	36.2
Fair Haven	5.1	117.3	31.1
New Bedford	1.9	119.2	29.2
Westport Fac- tory	6.3	125.5	22.9
Bliss Corners, R. I.	6.6	132.1	16.3
Tiverton	4.1	136.2	10.9
Newport	12.2	148.4	0.0

Newport-Plymouth (via Taunton), 60.1 Miles.

	Miles to	Total Miles	Out Return
Newport	0.0	0.0	60.1
Fall River	18.5	18.5	41.6
Somerset	5.9	24.4	35.7
Taunton	9.9	34.3	25.8

Hart's Corners...	1.9	36.2	23.9
Middleboro	9.2	45.4	14.7
Middleboro Green	1.8	47.2	12.9
Waterville	3.1	50.3	9.8
N. Carver.....	1.8	52.1	8.0
Plymouth	8.0	60.1	0.0

Plymouth-Springfield, 131.9
Miles.

	Miles to	Total Miles	
	Out	Return	
Plymouth	0.0	0.0	131.9
Kingston	4.5	4.5	127.4
West Duxbury...	4.3	9.8	123.1
Hanover	4.9	14.7	118.2
Whitman	7.7	22.4	110.5
Brockton	4.3	26.7	106.2
Stoughton	6.2	32.9	100.0
Sharon	4.9	37.8	95.1
Walpole	5.2	43.0	89.9
Medfield	4.4	47.4	85.5

Sherborn	6.1	53.5	79.4
S. Framingham..	4.0	57.5	75.4
Ashland	3.2	60.7	72.2
Westboro	8.9	69.6	63.3
North Grafton...	6.2	74.8	57.1
Worcester	6.1	80.9	51.0
Cherry Valley...	4.2	85.1	46.8
Spencer	6.8	91.9	40.0
E. Brookfield...	3.9	95.8	36.1
Brookfield	2.9	98.7	33.2
Warren	6.2	104.9	27.0
Palmer	11.6	116.5	15.4
N. Wilbraham...	5.1	121.6	10.3
Springfield	10.3	131.9	0.0

Springfield-New York City,
149.9 Miles.

		Total Miles
	Miles to	Out Return
Springfield	0.0	0.0 149.9

Windsor Locks,			
Conn.	13.5	13.5	136.4
Windsor	5.6	19.1	130.8
Hartford	6.5	25.6	124.3
Farmington	9.0	34.6	115.3
Plainville	4.6	39.2	110.7
Southington	4.7	43.9	106.0
Plantville	1.6	45.5	104.4
Waterbury	10.6	56.1	93.8
Middlebury	5.6	61.7	88.2
Southbury	9.1	70.8	79.1
Sandy Hook	6.4	77.2	72.7
Newtown	1.5	78.7	71.2
Danbury	9.4	88.1	61.8
Ridgefield, Conn.	9.3	97.4	52.5
S. Salem, N. Y...	3.8	100.2	48.7
Bedford	9.0	110.2	39.7
White Plains	15.9	126.1	23.8
Hart's Corners...	2.4	128.5	21.4
Bronxville	5.9	134.4	15.5
New York	15.5	149.9	0.0

FROM BOSTON TO THE BERKSHIRES.

A Four Days' Trip, Including the Wonderful New Road Which Has Just Been Completed by State Engineers Over the Old Mohawk Trail.

A NEW route from Boston to the Berkshires, available this year for the first time, has been made possible by the success of the Massachusetts State Highway Commission in conquering the great engineering difficulties of constructing a road over the Old Mohawk Trail. This path is famous in history as the route by which the Indians passed from the east to the west. Its scenic attractions are marvelous.

The tourist leaves Boston via Massachusetts and Commonwealth avenues. He passes the Harvard

yard and Washington elm, under which Washington took command of the Continental army, as well as Radcliffe college. Two old churches, the First Parish church and Christ church, which was built of material brought from England and contains a very fine set of old chimes, are nearby.

Passing through Arlington the road comes to Lexington, where the first skirmish of the Revolution was fought. The Monroe tavern, which was the headquarters of Earl Percy, the British commander on that occasion, is

still standing. On Lexington green the battle took place and each point is designated by a marker or monument, the chief one being the figure of a minute man standing on a pile of rocks.

The grave of John Hancock is in the old burying ground. There is still to be seen also the old Hancock-Clark house, in which Hancock and John Adams were sleeping when they were aroused by Paul Revere.

Seven miles further on is Concord, famous for its literary associations. Here Emerson, Haw-



New Bridge Over Deerfield River.

thorne, the Alcotts and Thoreau had their homes. The road passes Grapevine cottage, where is the arbor on which Concord grapes were first grown. The houses of the famous writers are still standing and may be seen by the traveller.

A pleasant drive brings the tourist to Groton, which is now famous as the seat of a private school for boys. Then the road enters New Hampshire, and near Marlo comes to the foot of Mt. Monadnock, 1736 feet high.

The next day's run starts out of Keene, along the Ashuelot river to Hinsdale, and there turns up the Connecticut to Greenfield. At Greenfield the tourist comes upon the Mohawk trail. It is said to have been marked by the Indians in the time of King Phillip and to have been used by them as a thoroughfare from the Connecticut to the Hudson rivers.

From Greenfield the route follows the Deerfield river through Shelburne falls to a point two miles beyond Charlemont, where it turns up a winding climb of the eastern slope of Florida mountain. This is sometimes called Hoosac mountain.

Up the steep ascent the road zigzags along the side of Cold Brook, but it has been so made that the grade nowhere exceeds nine per cent. and any car can make it on second gear. The surrounding country is very wild and thickly wooded, as until this road was completed, it was practically impenetrable. Whitcomb summit is climbed about 29 miles out from Greenfield. A flag pole marks the top of the mountain.

From this point the road is all on the down grade until the valley beyond is reached. There is one sharp turn blasted out of the rocky side of the mountain, but the road is smooth and so wide that it is not dangerous.

Few points in America have a scenic outlook superior to that from the top of the ridge. On a clear day the entire expanse of the Berkshires can be seen, with Mt. Greylock in the foreground and the Catskills, in New York, nearly 100 miles way, in the background. Immediately below are the tiled roofs of North Adams. From North Adams it is a short and pleasant run to Williamstown.

From Williamstown the road is

the same as that given in a reverse direction in tour No. 15 as far as Great Barrington, where it branches off to the south and east to Hartford.

Out of Hartford the route follows the Hockanum river to Manchester. The picturesque Bolton notch is passed and then the road descends the valley of the Hop

served in the revolution and was killed in the battle of Eastford; Nathan Hale and Jonathan Trumbull, who was one of the financiers of the revolution. At Pomfret are the historical "wolf den" and a well known school for boys. Entering Providence, the road passes the magnificent new state capital, which is a very interest-



A Cascade on the Deerfield River.

river. A great deal of fine new highway improved by the state is covered in this part of the trip.

Willimantic, in addition to being a very busy modern manufacturing town (sometimes called the "Thread City"), is well known for its historical associations. It was the home of Commodore Swift, U. S. N., General Lyon, who

ing example of modern architecture.

ITINERARY NO. 17.

Night Stops—Boston, Mass.: Keene, N. H.; Williamstown, Mass.; Hartford, Conn., and Providence, R. I.

Four Days, 349.7 Miles.

Boston-Keene, 87.5 Miles.

	Miles to	Out	Total Miles
		Return	
Boston	0.0	0.0	87.5
Cambridge	3.6	3.6	83.9
Arlington	3.3	6.9	80.6
Lexington	5.0	11.9	75.6
North Acton	13.5	25.4	62.1
Littleton Com-			
mon	2.9	28.3	59.2
Groton	6.9	35.2	52.3
Townsend	8.2	43.4	44.1
West Townsend	2.0	45.4	42.1
Ashby	4.6	50.0	37.5
West Rindge	12.9	62.9	24.6
Jaffrey	5.1	68.0	19.5
Marlboro	14.9	82.9	4.6
Keene	4.6	87.5	0.0

Keene-Williamstown, 80.8 Miles.

	Miles to	Out	Total Miles
		Return	
Keene	0.0	0.0	80.8
W. Swansey	5.4	5.4	75.4

Westport	2.4	7.8	73.0
Winchester	5.3	13.1	67.7
Hinsdale	5.7	18.8	62.0
E. Northfield	6.5	25.3	55.5
Northfield Village	1.0	26.3	54.5
Bernardstown	6.1	32.4	48.4
Greenfield	6.6	39.0	41.8
Shelburne	5.2	44.2	36.6
Shelburne Falls	3.9	48.1	32.7
Charlemont	8.7	56.8	24.0
Whitecomb Sum-			
mit	11.3	68.1	12.7
North Adams	7.3	75.4	5.4
Williamstown	5.4	80.8	0.0

Williamstown-Hartford, 97.4 Miles.

	Miles to	Out	Total Miles
		Return	
Williamstown	0.0	0.0	97.4
S. Williamstown	5.4	5.4	92.0
Lanesboro	11.6	17.0	80.4
Pittsfield	5.3	22.3	75.1
Lenox	6.6	28.9	68.5
Stockbridge	5.9	34.8	62.6
Great Barring-			
ton	7.4	42.2	55.2

Sheffield	6.1	48.3	49.1
Ashley Falls,			
Mass	4.0	52.3	45.1
Canaan, Conn.	2.2	54.5	42.9
Norfolk	7.4	61.9	35.5
Winstead	9.3	71.2	26.2
New Hartford	6.8	78.0	19.4
Canton	6.3	84.3	13.1
Avon	3.7	88.0	9.4
Hartford	9.4	97.4	0.0

Hartford-Providence, 84 Miles.

	Miles to	Out	Total Miles
		Return	
Hartford	0.0	0.0	84.0
Manchester Cen-			
ter	8.7	8.7	75.3
Bolton Notch	4.3	13.0	71.0
Andover	5.7	18.7	65.3
Williamantic	9.3	28.0	56.0
Phoenixville	14.5	42.5	41.5
Abington	4.5	47.0	37.0
Pomfret Center	2.8	49.8	34.2
Pomfret	2.1	51.9	32.1
Putnam, Conn.	3.4	55.3	28.7
Chepachet	13.3	68.6	15.4
Harmony	4.6	73.2	10.8
Providence	10.8	84.0	0.0

THE GREEN AND WHITE MOUNTAINS.

A Four Days' Tour from Springfield to Boston Via White River Junction, Montpelier, White Mountains, Concord and Lowell—The Interior of New England.

TO OPEN to the tourist some very attractive territory in the interior of New England, which is not covered by the main tours already given, Itinerary No. 18 has been prepared and is presented. This takes in some of the finest scenic displays in the Green and White mountains.

The trip starts from Springfield, Mass., and goes straight north.

First it crosses the Connecticut river into West Springfield, where is the old Shay house, built in 1754 by Captain Shay, who was one of the leading spirits in Shay's rebellion. The road then leads along the west bank of the river to Holyoke, where there are many large paper mills.

Just beyond Holyoke is Mt. Tom, one of the highest peaks in

the section, and a little further on Mt. Holyoke becomes visible. Mt. Holyoke college for girls can be visited and a little further on at Northampton is Smith college. There are a number of interesting drives about this city.

A little distance further on is Sugar Loaf mountain, the scene of some of the bloodiest events of the King Phillip and later Indian wars. On this mountain King Phillip is said to have established the headquarters from which he directed the campaigns of the western Indians. Table Rock, near the top of the mountain, has a seat cut in it which has been known as King Phillip's chair.

In South Deerfield is a monument on the Bloody Brook battlefield. This battle took place Sept. 18, 1675. Capt. Lathrop and 84 men were conveying grain wagons from the ruins of Deerfield to Hadley, and as they passed this spot they halted to rest and pick some wild grapes, which hung over the brook. While they were thus engaged 700 Indians fell upon them and after the melee only seven men were able to make their escape.

Deerfield was sacked and burned and then abandoned shortly after



New Mohawk Trail Road.

this encounter. Like so many New England towns, it was again settled after destruction and in 1694 it was once more attacked, but bravely defended by the settlers, who were headed by their pastor, Rev. John Williams. A third attack was made Feb. 29, 1704, and this time the village was destroyed, only one house being left standing. White captives numbering 112 were taken to Canada, where they were held for ransom. Memorial hall contains an excellent collection of relics of this event.

After passing Greenfield, the eastern terminus of the New Mohawk trail route, the river is again crossed and the tourist comes upon East Northfield, which is the seat of the Moody school for girls, and several other institutions that resulted from the activity of Dwight L. Moody. Mt. Herman school for boys is not far away.

There is a great dam across the river at Vernon, Vt., which furnishes Brattleboro with a fine lake front. Electricity furnished by the water that accumulates behind this dam supplies current to many towns in the northern Massachusetts as far distant as Worcester. Brattleboro is a business centre for a large part of Vermont and New Hampshire. The great Estey organ works here are of special interest to visitors.

Further on, at Putney, Vt., the earth contains great veins of roofing slate, which has been taken out of the ground there for many years. There is also a rare and valuable mineral known as fluor spar, which is deep green in color. In 1775 a strong timber fort was erected at this place, which protected the town until the conquest of Canada made the fort unnecessary.

Bellows Falls was a favorite fishing ground for the Indians, who came there to catch salmon and shad near the rapids. A short distance above are a number of hieroglyphics, cut in stone, which experts believe to be the record of an ancient battle. Within a half mile of the town the river drops 42 feet, forming a white and boiling rapids.

Massachusetts people originally settled Charlestown, N. H., which was known for a long time by the prosaic name of Number

Four. Between 1746 and 1760 it was attacked several times, but the defense was so gallant that the attempt at conquest was finally abandoned. During the French and Indian wars the place was a military base. It is situated between two broad, rich meadows, and has a long, wide, well shaded street.

Not far above Claremont, Ascutney mountain comes into view, and at Ascutneyville the tourist again crosses the river in Vermont. At Windsor during a heavy thunderstorm and just after the news of the fall of Fort Ticonderoga had been received, the representatives of the Vermont towns adopted the state constitution July 2, 1777.

made. Two hundred braves plundered the village, as well as Sharon, and carried away 27 prisoners.

Bethel is a busy manufacturing town among high hills. A little further on is the Williamstown gulf, through which a cool breeze is nearly always blowing. The view from this point to Barre and Montpelier is very fine.

Montpelier is the capital of Vermont. It is built on a plain near the Winooski river and is surrounded by highly developed farms on the hill sides. Under the portico of the state house are two cannon, taken from Breyman's Hessians at the battle of Bennington. The British got them back when General Hull sur-



A View from Charlemont, Mass.

The name Ascutney, which in the Indian tongue means Three Brothers, is supposed to refer to the three curious valleys that run down the side of the mountain. Early settlers used to say they often saw a curious light overhanging the peak at night. The night stop is made at White river junction, where the White and Connecticut rivers join.

The next day the route follows for a time the picturesque White river, branching off later to go through the Green mountains toward Montpelier. Joseph Smith, who founded Mormonism when he was living in New York state, was born at Sharon. At Roylton in October, 1780, the last attack of the Indians in New England was

rendered the army of the northwest at Detroit, but they were later returned to the Americans, and presented to the State of Vermont.

St. Johnsbury was settled in 1786 and named in honor of St. John de Crevecoeur, French consul at New York and a benefactor of the State of Vermont. There are many large factories in the town, of which the principal one is that of the Fairbanks scale company.

From the vicinity of Littleton fine views of the Franconia and White mountains may be obtained. It is on the Ammonoosuc river. The stop for the night is at Bretton Woods, in the White mountains.

Plymouth, on the Pemigewasset river, is one of the interesting points through which the tourist passes on the next day. Walker's hill overlooks the village and the valley and many of the great peaks of the region are visible in the distance. Mt. Prospect is four miles to the northeast and there is a good road to the summit. The White and Franconia mountains

the cold and boiling springs.

The drive around Plymouth mountain is of much interest and from its summit the view is much the same as from Mt. Prospect, although heavy forests cover the sides of the peak. Two miles north of Plymouth are the Livermore falls. Newfound lake is reached two miles out of Bristol, N. H. Sugar Loaf mountain

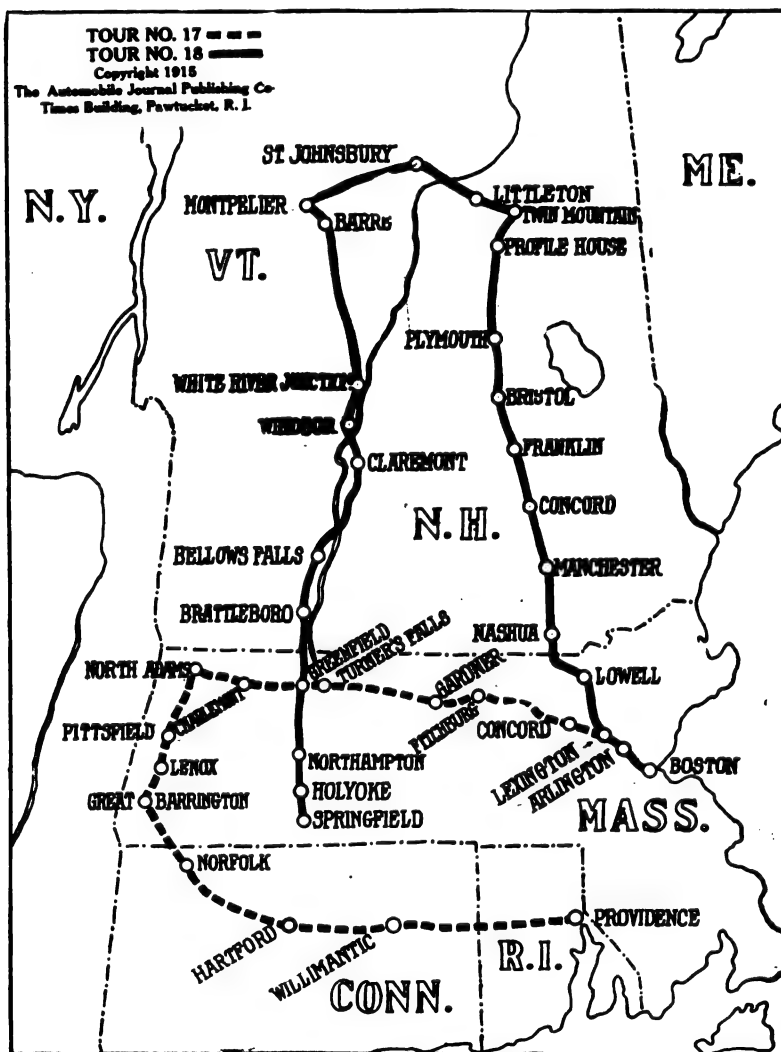
Through Concord and Manchester, along the same route followed for a time by tour No. 16, the road goes to Nashua. This town site was a sandy, barren plain as late as 1803, but mills were built along the river and operated by water power. These caused the town to grow rapidly. In 1853 it became a city.

Lowell is located at Pawtucket falls, which had once been a favorite fishing place of the Indians. In 1826 a town was laid out there and named Lowell, in honor of a citizen of Newburyport, who had been prominent in the early development of the cotton industry in the United States. The Pawtucket canal extends from the falls to the Concord river below—a fall of 33 feet, and supplies an enormous water power. To obviate the lack of water caused by a fall in the river level, a great dam was built at the outlet of Lake Winnepesaukee about 1850. From Lowell it is a short and easy run through Burlington, Arlington and Cambridge to Boston.

ITINERARY NO. 18.

Night Stops—White River Junction, Vt.; White Mountains, Concord, N. H.; Boston, Mass. Four Days, 440.5 Miles.

Springfield-White River Junction, 122.6 Miles.



may be seen to the north, among them Mt. Lafayette, Osceola and White Face, and below the Squam range, in the east is the beautiful Squam lake, dotted with islands. To the southeast are the shining waters of Lake Winnepesaukee, with Mt. Belknap looking over them. Mt. Prospect is 2072 feet above sea level and possesses several other objects of interest—the Miser's cave, the Avalanche and

is on the west shore and Crosby mountain on the east. Bristol is a fine town at the confluence of the Pemigewasset and Newfound rivers.

Near the town of Franklin, Daniel Webster was born in 1782. The family moved later to a new house at Webster place, which Daniel Webster afterwards bought and to which he often retired for rest. The night stop is Concord.

	Miles to	Total Miles	
	Out	Return	
Springfield	0.0	0.0	122.6
Holyoke	8.7	8.7	113.9
Northampton	9.0	17.7	104.9
South Deerfield	10.8	28.5	94.1
Deerfield	5.2	33.7	88.9
Greenfield	3.2	36.9	85.7
Bernardstown	6.4	43.3	79.3
Gullford	11.1	54.4	68.2
Brattleboro	2.8	57.2	65.4
Putney	9.2	66.4	56.2
Westminster	8.0	74.4	48.2
Bellows Falls	5.0	79.4	43.2
S. Charleston	3.5	82.9	39.7
Charleston	3.8	86.7	35.9
Claremont	10.8	97.5	25.1
W. Claremont	2.7	100.2	22.4
Ascuteyville	2.2	102.4	20.2
Windsor	5.3	107.7	14.9
Hartland	4.7	112.4	10.2
N. Hartland	4.6	117.0	5.6
White River Junction	5.6	122.6	0.0

White River Junction-White Mountains (Via Montpelier), 127.9 Miles.

	Miles to	Total Miles	
	Out	Return	
White River Junction	0.0	0.0	127.9
Hartford	1.6	1.6	126.3

W. Hartford	5.9	7.5	120.4
Sharon	6.0	13.5	114.4
Royalton	7.0	20.5	107.4
E. Bethel	5.3	25.8	102.1
N. Randolph	1.5	27.3	100.6
E. Randolph	3.5	30.8	97.1
E. Brookfield	6.4	37.2	90.7
Williamstown	7.6	44.8	83.1
Barre	5.7	50.5	77.4
Montpelier	6.5	57.0	70.9
E. Montpelier	7.1	64.1	63.8
Plainfield	4.1	68.2	59.7
Marshfield	6.4	74.6	53.3
Molly's Falls	1.8	76.4	51.5
South Cabot	2.8	79.2	48.7
Danville	8.7	87.9	40.0
St. Johnsbury	7.3	95.2	32.7
Lower Waterford	10.7	105.9	22.0
Waterford	3.3	109.2	18.7
Littleton	5.5	114.7	13.2
Bethlehem	5.0	119.7	8.2
White Mountains	8.2	127.9	0.0

White Mountains-Concord, 110.5 Miles.

	Total Miles	
	Miles to	Out Return
White Mountains	0.0	0.0
Woodstock	33.2	33.2
West Thornton	4.2	37.4
West Campton	5.5	42.9
Plymouth	7.5	50.4
Ashland	5.9	56.3
Holderness	4.0	60.3
Meredith	7.8	68.1
The Weirs	4.7	72.8
Lake Port	4.6	77.4
Laconia	1.7	79.1
Tilton	9.3	88.4
Franklin Falls	3.0	91.4
Franklin	0.8	92.2
Penacook	12.2	104.4
Concord	6.1	110.5

Concord-Boston, 76.7 Miles.

	Total Miles	
	Miles to	Out Return
Concord	0.0	0.0
Pembroke	5.9	5.9
Suncook	1.4	7.3
Manchester	11.4	18.7
Merrimac	8.4	27.1
Thornton's Ferry	3.6	30.7
Nashua	5.9	36.6
Tyngabore	6.5	43.1
Lowell	8.1	51.2
Billerica	6.2	57.4
Burlington	5.5	62.9
Arlington	7.4	70.3
Porter Square	2.6	72.9
Cambridge	1.0	73.9
Boston	2.8	76.7

FROM MAINE TO MONTREAL AND QUEBEC.

A Tour that Takes the Tourist Through the Great Maine Woods and French Sections of Canada, Along the St. Lawrence and Into the Lake Champlain Region.

FROM Portland, Me., north to Augusta, the capital of Maine, and thence to Quebec, along the beautiful St. Lawrence to Montreal and then southwest to Lake George, is an extremely interesting tour through a country of delightful variety.

The early part of the trip lies through the thick Maine woods, where fishing and hunting are still fine. The roads are improved and the route is perhaps the best on which to enter Canada. Once across the line the tourist sees the famous Quebec rural regions and the farm homes of the quaint French habitants. Almost from the time he enters Canada on this trip until he leaves, the tourist will find French to be the exclusive language.

Augusta where the start is made, is at the head of navigation for small ships on the Kennebec. The city lies on both sides of the river. The road runs directly up the river to Waterville, the seat of Colby university, where, on the campus nestling among the trees, is an unusual monument to the students of the college who fell in the civil war.

The woods beyond Waterville become very thick and the country very wild. Moose and caribou abound here. For a few miles near the international boundary line the road is rough and dangerous, but elsewhere it is newly im-

proved and excellent both in Quebec and in Maine.

Some very charming views of the Chaudiere valley and of the Laurentide mountains in the distance are obtainable. The French villages, which one begins to en-

America and is situated at the confluence of the St. Charles and St. Lawrence rivers. For many years it was the second city in Canada, but it has now been far outstripped by Toronto, Winnipeg and others of the newer cities.



Grand Falls, Webster Stream, One of Many Cataracts in Northern Maine.

counter directly the Canadian line is crossed, are very picturesque and interesting. Hotel accommodations, however, are not good.

Quebec itself is a city of great beauty and historic significance. It is known as the Gibraltar of

Quebec was built nearly in the shape of a triangle, abutting on the two rivers and the Plains of Abraham. It is divided into the upper and lower cities. The latter is a very old town, walled and fortified and standing on a bluff

350 feet above the river.

Dufferin Terrace is one of the show spots of Quebec. It is the site of the old Chateau St. Louis, which was built by Champlain in 1620, and which served as a fortress, prison and governor's palace, until it was ruined by fire in 1834. The lower town, with its twisting streets and wharves, is in the immediate foreground, while below is the beautiful Isle of Orleans, and beyond are the bold peaks of the Laurentian range, with Cap Tourmente towering over the river in the distance. The terrace is a favorite promenade in Quebec.

Among other points which the tourist will find it worth while to

From Quebec the road to Montreal lies along the north shore of the St. Lawrence river all the way. It crosses the Jacques Cartier river, famous for its salmon, not far from Quebec, and the St. Anne river at Portneuf. The St. Lawrence is in full view for the first half of the route and many small streams which empty into it are crossed along the way.

Three Rivers is the largest town between the two cities. It was built in 1634 and lies at the mouth of the St. Maurice river, at the head of tidewater on the St. Lawrence. There is a hotel here and garages, as well as an impressive cathedral. Near Louiseville are the St. Leon springs, a

Canada. It was settled by the French early in the 17th century. It was assaulted many times by Indians, by the English and twice unsuccessfully by American soldiers. The city is situated on an island at the confluence of the St. Lawrence and Ottawa rivers. The island has an area of 197 square miles. Three-fourths of the population are French and practically all of them are Catholics.

Although Montreal is several hundred miles from the sea, it is the largest port in point of importations in Canada.

The church of Notre Dame is the most massive, largest and best known on the continent. It seats 8000 people on the main floor and 2000 in the balconies. The interior is not, however, particularly impressive. It has two great towers of the simplest Gothic architecture, in one of which hangs "Gros Bourdon," a very large bell, which weighs more than 15 tons. McGill university, opened in 1828, is one of the interesting institutions of the city.

The Lachine rapids, which boil and whirl over submerged rocks in the river, are shot by steamers which pick their way accurately through a narrow channel. This gorge is one of the most picturesque and beautiful in America.

From Montreal the route goes southwest following the direction taken by the Richelieu river through Chambly to Rouses Point on the international boundary line. It runs south to Plattsburg, on Lake Champlain, where there is an important United States army post and runs parallel with the shore line of Lake Champlain for a considerable distance, affording some very fine scenery.

When within 19 miles of Elizabethtown it is possible to make a short detour to Ausable chasm, where there is a good hotel. The chasm is well worth seeing. The Ausable river here flows through a narrow gorge with precipitous sandstone sides. Numerous bridges have been built across it and the rapids are shot by guides in small boats who will carry passengers. At the head of the gorge are Rainbow falls, which will interest the visitor.

Some of the finest country in New York State from a scenic point of view is encountered on the short run from Elizabethtown to the town of Lake George. Out



General View of a Portion of Quebec Overlooking the St. Lawrence.

see are the Angelican cathedral, St. Louis gate, the Citadel, St. John's gate, Palace gate, Hope gate, Prescott gate, Market square, the Seminary, Laval university, the Ursuline convent and the Parliament house. Each of these possess much interest.

There are many interesting short trips that may be made from the city. One is to St. Anne de Beaupre, to which every year thousands journey for the purpose of seeing the relics there which are believed to effect miraculous cures. The Falls of St. Anne are worth a visit and also the falls of Ste. Fereol, further to the east. Then there is Lake Beauport, Indian Lorette and Cap Rouge.

popular watering place. At Berthier the St. Lawrence expands into a large lake, which is known as Lake St. Peter. It is 25 miles long and about nine miles wide.

There are many of the famous islands of the St. Lawrence near Berthier. At the mouth of the Riviere des Prairies is the quaint old village of L'Assomption. There are valuable mineral springs near here, at Varennes, which are much visited by people from Montreal. At Boucherville are many low, marshy islands, where there is a great deal of duck shooting in season, and where many ice jams form at the break up of winter.

Montreal is the largest and one of the most interesting cities of

of Elizabethtown the road follows the valley of the Boquet river. Then the Schroon river valley is taken up and followed to Schroon lake and along the border of this charming sheet of water, through Schroon Lake village and Taylor-on-Schroon. Schroon lake has an elevation of 807 feet above the sea level.

Chesterton is a beautiful hamlet on Loon lake, a very pretty little sheet of water, and then the road comes to Lake George, which has considerable size, as well as rare scenic attractiveness.

Lake George was first looked upon by a white man in 1642. The Iroquois had captured a French priest, Father Isaac Jogues, and took him across the lake after having tortured him almost to the point of death. He escaped and went to France. When he returned in 1648 he was very soon killed by a member of the same tribe.

The name given by him to the lake was the "Lac du St. Sacrament," and it is still known as that by the French. For a hundred years Lakes George and Champlain afforded routes for the war parties which were constantly travelling between Canada and the British colonies on this side of the border.

In 1755 General Johnson camped on the lake and named it Lake George, in honor of George II. It was called Horicon in the fiction of J. Fenimore Cooper and that name is now sometimes applied to it. The French and English met in battle on the lake in 1755 near what is now the Halfway house. A monument marks the spot. About three miles from this place is a pool of water, known as "Bloody Pond," from the fact that a party of French, surprised there by the English, were killed and their bodies thrown into the water.

ITINERARY NO. 35.

Night Stops—Portland, Augusta, Me.; Quebec, Montreal, P. Q.; Elizabethtown, N. Y. Five Days, 578.4 Miles.

Portland-Augusta, 64.8 Miles.

	Miles to	Total Miles	Out Return
Portland	0.0	0.0	64.8

Morill's Corners	3.1	3.1	61.7
Allen's Corner	0.9	4.0	60.8
Gray	13.1	17.1	47.7
North Gray	2.4	19.5	45.3
Upper Gloucester	5.3	24.8	40.0
Auburn	8.7	33.5	31.3
Lewiston	0.4	33.9	30.9
Greene	8.0	41.9	22.9
Winthrop	12.5	54.4	10.4
Manchester	5.9	60.3	4.5
Augusta	4.5	64.8	0.0

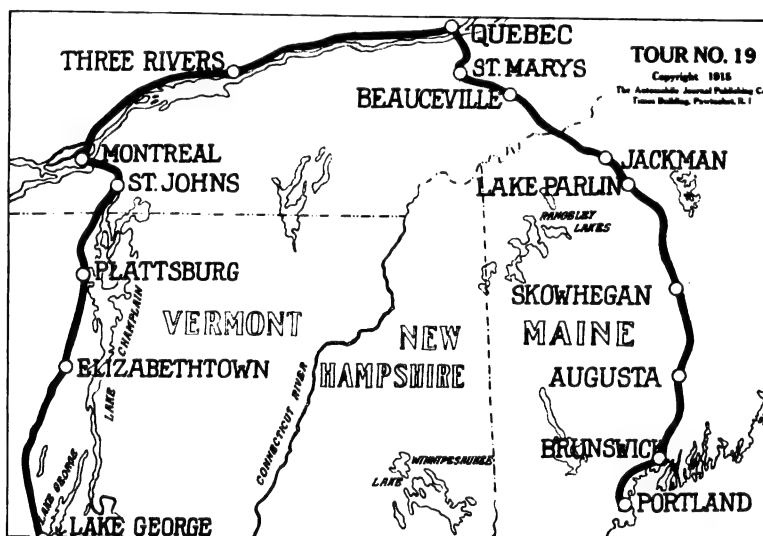
Augusta-Lake Parlin, 97 Miles.

	Miles to	Total Miles	Out Return
Augusta	0.0	0.0	97.0
Waterville	19.6	19.6	77.4
Fairfield Center	4.1	23.7	73.3
Skowhegan	12.3	36.0	61.0
Lakewood	5.7	41.7	55.3
Solon	8.4	50.1	46.9
Bingham	8.5	58.6	38.4
Carratunk	15.3	73.9	23.1
The Forks	7.4	81.3	15.7
Lake Parlin	15.7	97.0	0.0

Portneuf	5.1	37.8	138.9
Deschambault	4.2	42.0	134.7
La Chevrotiere	4.8	46.8	129.9
Grandines	2.3	49.1	127.6
Ste Anne De La Perade	8.8	57.9	118.8
Champlain	8.1	66.0	110.7
Cap de la Madeleine	9.7	75.7	101.0
Three Rivers	3.9	79.6	97.1
Pointe du Lac	9.1	88.7	88.0
Yamachiche	8.3	97.0	79.7
Maskinonge	14.1	111.1	65.6
Berthier	14.2	125.3	51.4
Lanoraie	9.2	134.5	42.2
Lavaltrie	6.1	140.6	36.1
St. Sulpice	5.7	146.3	30.4
L'Assomption	5.2	151.5	25.2
Charlemagne	8.7	160.2	16.5
Montreal	16.5	176.7	0.0

Montreal-Elizabethtown, 118.9 Miles.

	Miles to	Total Miles	Out Return
Montreal	0.0	0.0	118.9
Longueuil Ferry	2.2	2.2	116.7



Lake Parlin-Quebec, 121 Miles.

	Miles to	Total Miles	Out Return
Lake Parlin	0.0	0.0	121.0
Jackman, Me.	12.7	12.7	108.3
Moose River, Me.	1.5	14.2	106.8
Line House	14.2	28.4	92.6
Armstrong, P. Q.	11.0	39.4	81.6
Jersey	16.7	56.1	64.9
St. George	1.9	58.0	63.0
Gilbert	7.0	65.0	56.0
Beauceville	2.9	67.9	53.1
Des Plantes	3.5	71.4	49.6
St. Joseph	6.4	77.8	43.2
Beauce Junction	5.3	83.1	37.9
Ste. Marie	7.0	90.1	30.9
Scott Junction	5.1	95.2	25.8
St. Henri	14.7	109.9	11.1
Levis-Quebec Ferry	10.7	120.6	0.4
Quebec	0.4	121.0	0.0

Quebec-Montreal, 176.7 Miles.

	Miles to	Total Miles	Out Return
Quebec	0.0	0.0	176.7
St. Augustin	14.3	14.3	162.4
Les Ecureuilis	14.2	28.5	148.2
Cap Sante	4.2	32.7	144.0

Longueuil	0.8	3.0	115.9
St. Hubert	5.0	8.0	110.9
Chambly	8.9	16.9	102.0
St. John, P. Q.	11.4	28.3	90.6
Rouse's Point	24.1	52.4	66.5
Champlain	5.1	57.5	61.4
Beekmantown	17.1	74.6	44.3
Plattsburg	6.6	81.2	37.7
Keeseville	15.8	97.0	21.9
Elizabethtown	21.9	118.9	0.0

Elizabethtown-Lake George, 69.3 Miles.

	Miles to	Total Miles	Out Return
Elizabethtown	0.0	0.0	69.3
Schroon River	22.6	22.6	46.7
Schroon Lake	9.1	31.7	37.6
Taylor's-on-Schroon	5.6	37.3	32.0
Potterville	3.9	41.2	28.1
Loon Lake	4.9	46.1	23.2
Chestertown	4.0	50.1	19.2
Warrenburg	12.7	62.8	6.5
Lake George	6.5	69.3	0.0

TOURS BY ELECTRIC IN NEW ENGLAND.

FOR the first time owners of electric cars who desire to tour the New England states can

Cape Cod, Plymouth and a thousand other points of interest.

Readers of the Automobile

in the road directions.

In another part of the book is a list of exact addresses of charging stations, so that on arrival at a town the place at which the batteries may be recharged can be found in the shortest possible time.

Not only are the addresses of charging stations given, but a classification has been arranged by the Electric Motor Car Club of Boston showing the range of service which each station is equipped to give.

Four classifications are given in the book, AA indicating stations that have very complete equipment and a thorough knowledge of electric vehicles, so that they are able to meet any requirement of service. A indicates good service, and B emergency stations. C indicates that the Boston Electric Motor Club has not a good knowledge of the capabilities of the station.

With this book electric touring is as simple as touring by gasoline car. Every necessary detail is given, so that a tour can be mapped out in advance and carried through as planned without the least difficulty.

Owing to its greater age and more dense population New England was the first section of the country to be opened up to motor



Silver Lake, in New Hampshire, with Mt. Chocoma in the Distance.

this year reach without difficulty every leading point of interest in this richest of scenic and historic sections.

The mountains, lakes and rivers of New England have in the past, and still continue to attract thousands of touring parties who use gasoline cars, but owing to lack of knowledge of the location of charging stations touring by electric has never been undertaken to any considerable extent in the past.

Towns of fair size are so frequent in New England, however, that touring by electric car is quite practicable for the distances between charging stations are not great. All that is necessary is to know where to find charging stations without delay and to be assured in advance that service can be given.

For this purpose the Goodrich touring bureau has prepared the map shown on the opposite page. This gives the routes that are practical for electrics and the towns in which charging stations are located.

A glance at the map indicates how thoroughly the territory can be covered. Not only are the main roads between the larger cities open to electric travel, but it is possible to go to the White and Green mountains, the Berkshires, the great fishing grounds at Rangeley and Moosehead lakes,

Journal can secure this book with maps and the detailed road directions and the exact addresses of charging stations without charge by communicating with the B. F. Goodrich branches in Boston or New York, or with the Electric Motor Car Club of Boston at 39 Boylston street.

The road directions are given in precisely the same way as those for gasoline cars. In addition, each city in which there is a charging station is specifically designated both on the map and



The New Road Near Greenfield, Mass.

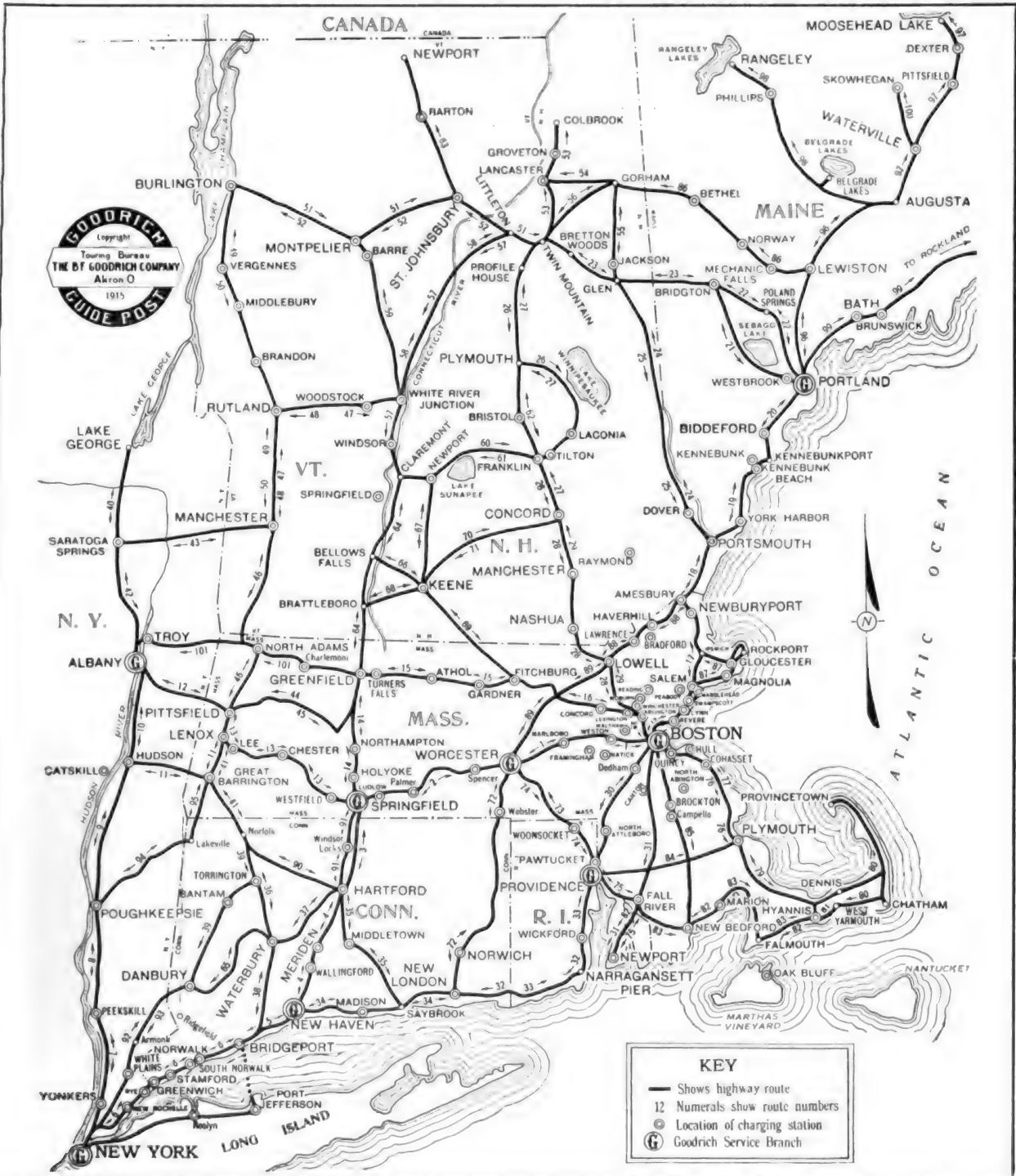
tourists. The roads there are older than in other portions of the country and much more improved.

The development of touring on a grand scale in connection with the fact that the conduct of summer resorts is one of the leading

businesses in certain parts of New England, has lead to a more advanced good roads movement in that section than in perhaps any other part of the country.

Tourists by electric car are, therefore, particularly fortunate that this section should be avail-

able for the electric car tours. It is quite likely that the success of electric car touring in New England will lead to the development of similar routes in other sections of the country where towns are sufficiently close together to make it practicable.



MAKE TOURING NOTES ON THIS PAGE

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

LAKE ONTARIO AND NIAGARA FALLS.

From Montreal to Albany, Via Toronto, Buffalo and Syracuse—A Tour of Great Interest Touching Canadian and New York Points.

CIRCLING Lake Ontario and taking the tourist through the beauties of the lower St. Lawrence to Niagara Falls, tour No. 52 will be found to be one of great attractiveness. It may be taken in combination with tour No. 18 from Portland, Me., which is followed to Montreal, or by taking route 55 in a reverse direction from New York City to Lake George and then following No. 18 in a reverse direction to Montreal.

The first day's run is from Montreal to Ottawa. There is another road in somewhat better condition straight down the St. Lawrence river, but this does not touch Ottawa, which is the capital of Canada, and holds large interest for the visitor. Neither road is satisfactory in wet weather, as the ground is clay and if the tourist should strike this point after prolonged rains it is best to ship the car by boat to Kingston and resume the tour there.

The way leads across the island of Montreal and then across the Isle of Jesus, after which it circles the shore of the Lake of Two mountains to St. Andrews on the River Du Nord. It goes through

Carillon and crosses the Ottawa river at Point Fortune, following the southern shore of this river to Little Rideau and L'Original.

Here it turns back into the country from the river through the towns of Alfred and Plantagenet and back again to the Ottawa at Wendover, skirting the river again to Clarence, Rockland and Orleans.

The Canadian government buildings are situated on a picturesque bluff over the Ottawa river 150 feet high. There are three blocks of departmental buildings, with the parliament house occupying the fourth side of the square. At the west end of the city are the Chaudiere falls, where the river dashes over a high ledge of rock. These falls furnish power for extensive lumbering operations that are carried on in the city. They also furnish electrical power for lighting and driving the city street car system.

The next day the route leads almost directly south toward the states and is very much better than that travelled the day before. The St. Lawrence is reached at Morrisburg and along the river,

the route runs to Prescott. This is directly opposite Ogdensburg, N. Y.

Below Prescott is the Patriots' windmill, which was the scene of a bloody conflict during the uprising of 1837. The old mill has been converted into a lighthouse. In making the trip by water from Montreal to the Thousand Islands the passengers change at Prescott to smaller boats, which are better able to navigate the narrow passages of the islands, and to shoot the many rapids.

Further down the north shore of the river at Brockville there is another ferry to Morristown, N. Y. The road for a space here runs a distance back from the river, although the Thousand Islands are to be seen from time to time and at Gananoque the tourist comes in full sight of them. The Rideau river is crossed in Kingston, which is the stop for the night.

Kingston is a quaint and attractive city. It has many sharp contrasts. There is a bright modern business section and many very old forts, and the remnants of the life led there by the early settlers who lived always in fear



The Thousand Islands, from Alexandria Bay, One of the Prettiest Playgrounds in Northern New York.

of attack. The chief places of interest are Fort Henry, the Royal Military college, where the officers of the Canadian forces are instructed; Queen's university and St. George's cathedral.

The next day's route follows the north shore of Lake Ontario all the way to Toronto. Many splendid views of the lake are to be had from the road and the towns along the way are large enough to furnish supplies for man and car.

Toronto is the industrial and financial centre of Canada. It is a fine modern city. There is much excellent architecture in the city and it contains several well known educational institutions, including McGill university. There are num-

pice, although at certain seasons the river at the falls is shallow and the volume of water not so large as might be imagined.

Fully as interesting as the falls themselves are the rapids below them, where the water roars and tumbles at terrific speed over submerged rocks. The great fall of water has worn away the face of the rock a few inches every year and since prehistoric times the great falls have moved gradually but surely upstream.

From Brock's monument on a high hill on the Canadian side of the river the city of Toronto can be seen in the distance. It is not a long trip by boat across the lake to that city. As the falls are approached by the tourist the roar

The points of interest along the way include the home of Joseph Smith at Palmyra. Smith was the founder of Mormonism and it was here that he claimed to have discovered the golden plates of the book of Mormon. Not far away is the village of Hydesville, where the Fox sisters lived. They had a large part in establishing the doctrines and practises of spiritualism.

Three miles north of Oneida, N. Y., is the famous Oneida community, which has been in existence since 1847. Southward is the Oneida Indian reservation, from which excellent views of Oneida lake may be obtained. Auburn is the site of a famous New York state's prison, and Syracuse and Utica are well known industrial cities. Schenectady is the seat of the great works of the General Electric Company.

It may be desired to take this trip in a reverse direction. Tour 55 followed backwards from New York City to Albany will make that possible. It is only a short distance over good roads from Albany to Pittsfield, in the heart of the Berkshire hills.

ITINERARY NO. 52.

Night Stops—Montreal, Ottawa, Kingston, Toronto, Can.; Buffalo, Syracuse and Albany, N. Y. Six Days, 846.2 Miles.

Montreal-Ottawa, 121 Miles.

	Miles to	Total Miles	Out Return
Montreal	0.0	0.0	121.0
St. Laurent	6.9	6.9	114.1
Borde a Plouffe ..	4.1	11.0	110.0
St. Martin	1.6	12.6	108.4
St. Eustace	7.9	20.5	100.5
St. Benoit	11.3	31.8	89.2
St. Placide	6.4	38.2	82.8
St. Andrews East ..	8.4	46.6	74.4
Carrillon	2.2	48.8	72.2
Ferry to Point Fortune			

Little Rideau	5.4	54.2	66.8
Hawkesbury	7.7	61.9	59.1
L'Original	3.1	65.0	56.0
Cassburn	2.5	67.5	53.5
Alfred	10.0	77.5	43.5
Plantagenet	7.0	84.5	36.5
Wendover	6.0	90.5	30.5
Clarence	5.5	96.0	25.0
Rockland	2.5	98.5	22.5
Cumberland	5.0	103.5	17.5
Orleans	7.0	110.5	10.5
Ottawa	10.5	121.0	0.0

Ottawa-Kingston, 132.5 Miles.

	Miles to	Total Miles	Out Return
Ottawa	0.0	0.0	132.5
S. Gloucester	13.0	13.0	119.5



Niagara Falls, as Seen from the Canadian Side.

erous summer resorts on the shores of the lake in both directions from Toronto. There is a great Canadian fair and industrial exposition every year at Toronto, to which visitors come from all over Canada and from the northern part of the United States.

The next day's route goes through Hamilton, Ont., a thriving modern industrial city, and ends at Niagara Falls, perhaps the best known natural wonder on the American continent. The points of interest here are the falls themselves, a sheer drop of the Niagara river on its way from Lake Erie to Lake Ontario. Most of the water that falls in the great lakes basin goes over this preci-

ous of the water may be heard from a point not very far after Hamilton is passed.

It is a short trip of only 20 miles over good roads to Buffalo. This city is an important centre of east and west bound traffic. The tourist from the east can easily pick out a route into the middle west from Buffalo and the westerner here finds himself at the gateway of the marvelous touring country of New York and New England.

From Buffalo to Syracuse the route leads through the well known Montezuma swamps, through which passage is difficult in wet weather. This stretch of road is between Montezuma and Port Byron.

Metcalf	4.0	17.0	115.5
Ormond	8.0	25.0	107.5
Winchester	4.0	29.0	103.5
Cass Bridge	3.5	32.5	100.0
Williamsburg	8.5	41.0	91.5
Morrisburg	6.0	47.0	85.5
Iroquois	6.0	53.0	79.5
Cardinal	5.5	58.5	74.0
Prescott	9.6	68.1	64.4
Brockville	12.2	80.3	52.2
Lyn Village	6.3	86.6	45.9
Gananoque	27.3	113.9	18.6
Kingston	18.6	132.5	0.0

Kingston-Toronto, 165 Miles.

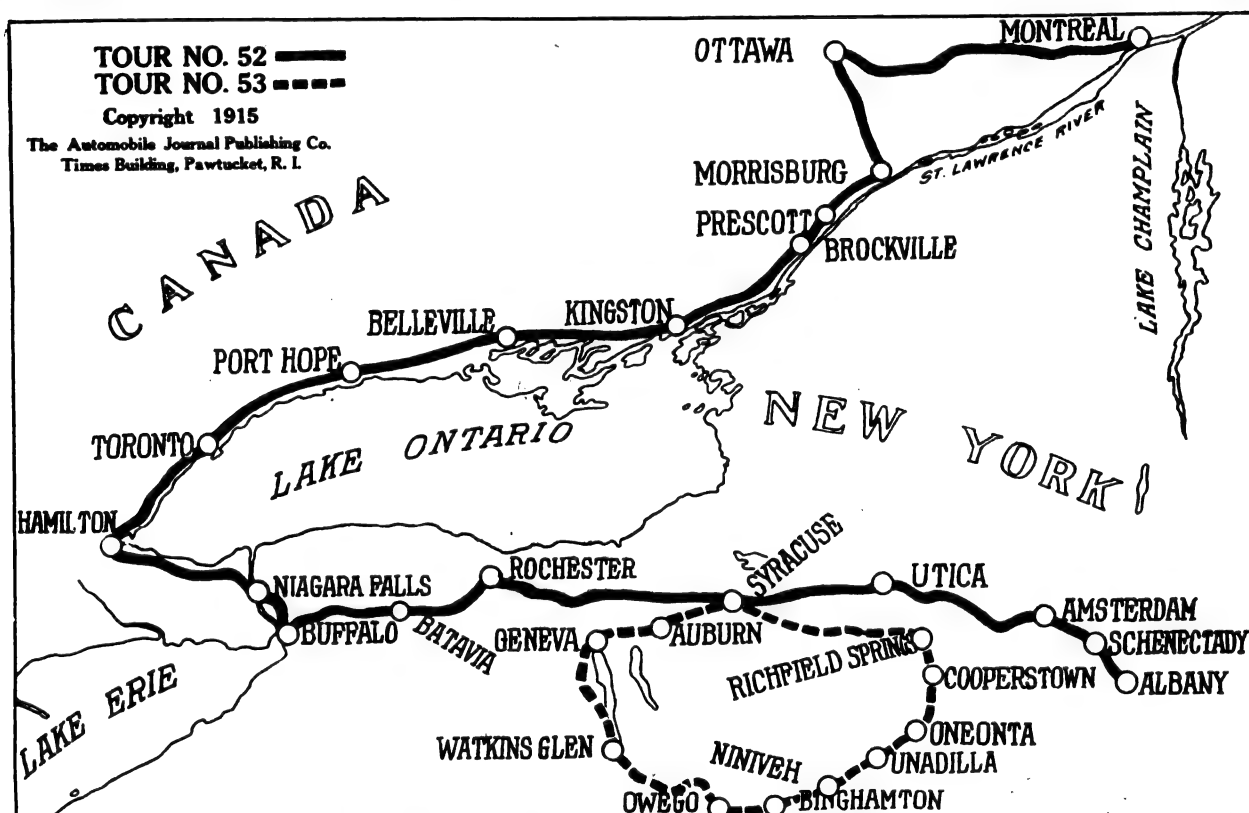
	Miles to	Total Miles	
	Out	Return	
Kingston	0.0	0.0	165.0
Cataract	3.6	3.6	161.4
Napanee	21.9	25.5	139.5

Cooksville	16.3	16.3	103.8
Erindale	3.3	19.6	100.5
Trafalgar Village	5.1	24.7	95.4
Appleby	10.3	35.0	85.1
Freeman	3.8	38.8	81.3
Aldershot	2.8	41.6	78.5
Hamilton	5.4	47.0	73.1
Stony Creek	6.7	53.7	68.4
Winona	5.6	59.3	60.8
Grimsbey	5.1	64.4	55.7
Beamsville	4.9	69.3	50.8
Vineland	4.2	73.5	46.6
Jordan	1.8	75.3	44.8
St. Catharines	7.1	82.4	37.7
Homer	3.3	85.7	34.4
St. David	4.9	90.6	29.5
Stamford	2.1	92.7	27.4
Niagara Falls, Ont.	4.8	97.5	22.6
Niagara Falls, N. Y.	1.0	98.5	21.6

Yellow Mills	2.7	94.8	67.2
Palmyra	1.2	96.0	66.0
East Palmyra	4.9	100.9	61.1
Newark	4.6	105.5	56.5
Lyons	6.1	111.6	50.4
Lock Berlin	4.2	115.8	46.2
Clyde	4.4	120.2	41.8
Savannah	6.4	126.6	35.4
Montezuma	5.4	132.0	30.0
Port Byron	4.6	136.6	25.4
Weedsport	3.5	140.1	21.9
Elbridge	6.4	146.5	15.5
Camillus	7.2	153.7	8.3
Syracuse	8.3	162.0	0.0

Syracuse-Albany, 145.6 Miles.

	Miles to	Total Miles	
	Out	Return	
Syracuse	0.0	0.0	145.6
Fayetteville	7.6	7.6	138.0
Mycenae	4.5	12.1	133.5



Maryville	8.4	33.9	131.1
Shannonville	6.7	40.6	124.4
Belleville	8.8	49.4	115.6
Trenton	11.3	60.7	104.3
Brighton	9.4	70.1	94.9
Colborne	8.5	78.4	86.6
Grafton	7.8	86.2	78.8
Cobourg	7.6	93.8	71.2
Port Hope	7.4	101.2	63.8
Welcome	3.1	104.3	60.7
Newcastle	13.3	117.6	47.4
Boumanville	5.2	122.8	42.2
Oshawa	9.4	132.2	32.8
Whitby	4.2	136.4	28.6
Pickering	6.1	142.5	22.5
Liverpool	2.2	144.7	20.3
Riverdale	18.5	163.2	1.8
Toronto	1.8	165.0	0.0

Toronto-Buffalo, 120.1 Miles.

	Miles to	Total Miles	
	Out	Return	
Toronto	0.0	0.0	120.1

Keshota Station	2.5	101.0	19.1
La Salle	3.0	104.0	16.1
N. Tonawanda	6.2	110.2	9.9
Tonawanda	0.4	110.6	9.5
Buffalo	9.5	120.1	0.0

Buffalo-Syracuse, 162.0 Miles.

	Miles to	Total Miles	
	Out	Return	
Buffalo	0.0	0.0	162.0
Williamsville	9.8	9.8	152.2
Clarence	8.3	18.1	143.9
Pembroke	7.9	26.0	136.0
East Pembroke	6.6	32.6	129.4
Batavia	6.6	39.2	122.8
Byron	9.8	49.0	113.0
Bergen	6.6	55.6	106.4
Churchville	3.4	59.0	103.0
North Chili	4.4	63.4	98.6
Rochester	10.4	73.8	88.2
Brighton	3.2	77.0	85.0
Fairport	6.8	83.8	78.2
Macedon	8.3	92.1	69.9

Sullivan	4.3	16.4	129.2
Canastota	5.1	21.5	124.1
Wampsville	2.2	23.7	121.9
Oneida	3.4	27.1	118.5
Oneida Castle	1.4	28.5	117.1
Vernon	5.2	33.7	111.9
Kirkland Village	8.3	42.0	103.6
New Hartford	5.1	47.1	98.5
Utica	3.5	50.6	95.0
Deerfield	1.4	52.0	93.6
West Schuyler	1.0	53.0	92.6
Ilion	10.4	63.4	82.2
Herkimer	2.7	66.1	79.5
Little Falls	7.3	73.4	72.2
St. Johnsville	10.5	83.9	61.7
Palatine Bridge	8.8	92.7	52.9
Yost's Station	6.2	98.9	46.7
Fonda	5.3	104.2	41.4
Alken	7.7	111.9	33.7
Amsterdam	3.0	114.9	30.7
Scotia	14.1	129.0	16.6
Schenectady	1.6	130.6	15.0
Albany	15.0	145.6	0.0

THE LAKES OF CENTRAL NEW YORK.

After a Day in the Vicinity of James Fenimore Cooper's Home, the Tourist Reaches One of America's Most Interesting Groups of Inland Lakes.

FOR those who delight in the romantic, somewhat off the beaten paths, no section of the East contains more charm than the lake district of central New York. Fortunately the towns in the vicinity early recognized the advantages of cultivating automobile touring, inasmuch as they are not a little neglected by the railroads. Their delightful scenery is such as to merit wide attention on the part of the tourist and the motor car has done much to bring these beauties within easy reach.

James Fenimore Cooper, is on the shore of Otsego lake, and this entire region has been so touched by his genius as to be familiar ground to those who revel in his works. In a park at the centre of the town is a boulder surmounted by the figure of an Indian, which marks the spot where Cooper lived. Fairly good roads encircle the lake, and time might be spent profitably in catching numerous glimpses of its remarkable beauty on this side trip.

The night stop is at Richfield

Mohawk valley, which is followed into Syracuse, not forgetting to mention Cazenovia, a summer resort of considerable repute situated at the foot of a pretty little lake, which empties into Lake Oneida. Time should permit of taking the pleasing little drive about the shores of this sheet of water. After leaving Syracuse, the main route through central New York is followed for a time, practically into Geneva.

Auburn is on Cayuga lake, which may be skirted if it is desired to extend the tour beyond the three days originally planned. This additional mileage will amply repay, as there are many attractions within easy driving distance. Among these may be mentioned Taghanic falls, at the end of a gorge a mile long and 400 feet deep, where the water takes a sheer drop of 250 feet, higher than Niagara.

Geneva is on Seneca lake, which is reached along the banks of the Seneca river from Seneca Falls, after the Montezuma marshes are passed. This lake is considered the most picturesque of the entire group. It is 38 miles long and from two to six miles wide. Steamers may be taken from Geneva to Watkins, if more time is desired for exploring portions of this district. This route anticipates making Penn Yan, on the shores of Keuka lake, the night stop.

Penn Yan is some 900 feet above the level of Seneca lake, and the road from Geneva is a gradual rise, although it can be made practically all of the way on high speed. Possibly it will be well to continue the journey about two miles south of the city itself for the night stop, as here opportunity is afforded to spend the night on the banks of the lake in a new hostelry, which is famed throughout this district for treatment accorded to motorists.

The third day finds the tourist between the two arms of the lake



Pine Grove Drive, a Pleasing Scene Near Richfield Springs, N. Y.

Leaving Binghamton the morning of the first day, the tour follows the valley of the Susquehanna river for some distance, skirting the foothills of the Catskill mountains, particularly as the route nears Oneonta. Numerous small lakes and pretty little trout brooks divide attention with the hills and mountains in the distance, but it is not until Cooperstown is reached that it may be said the lake region is entered.

Cooperstown, the home of

Springs on Canandarago lake, better known by the name of Schuylers. No more inspiring views are to be found anywhere on the American continent than in this vicinity. It is extremely doubtful if the tourist will be satisfied with a night stop at this point, but other lakes still further along offer other charms, and it will be hard for the motorist to decide just how much time he may allow himself away from home.

The second day's run enters the

on his way to Bluff Point, 700 feet above the surface of Keuka, which is 900 feet above the level of Seneca. From this elevation an extensive view of the surrounding country is obtained, a clear day affording glimpses of four counties. Looking down upon the lake itself, the visitor is surprised to see what appears to be a toy steamboat, and finds it hard to believe it is one of the large lake steamers with a capacity of 400 to 500 people. Immediately below a reflection of glistening oars and little specks on the water, not unlike a school of minnows, prove to be full sized row-boats filled with fishing parties.

Keuka lake is in the centre of the rich grape country, and the district is famed for its wines and champagnes. None the least of the pleasing pictures from Bluff Point are the vine clad, ravine broken hills, many of which will be visited on the trip from Bluff Point to Hammondsport, but first the tourist must turn north to get around the lower end of the other arm of the lake at Branchport.

From Branchport to Hammondsport is a steady drop, with the lake level lost to view. On either side are to be seen the vineyards, and at Hammondsport, 300 feet above the surface of the lake, the tourist finds a view to the northward, which for breadth, distance and picturesque beauty is to be equalled nowhere.

Hammondsport is the home of Glenn H. Curtiss, and his plant for the manufacture of aeroplanes. A visit to this industry will offer a pleasing diversion, as many of the Curtiss aviators are continually testing out new machines in the vicinity of the city. Recent activities have been in connection with the perfection of the hydaeroplane, and the waters of the lake are utilized by the United States naval students of aviation as well as the Curtiss instructors in exploiting the latest inventions.

Turning eastward again, the way leads past Lake Wauneta, between Weston and Wayne, and then on to Watkins, at the southern end of Seneca lake. Here, time should be spent in visiting the famous Watkins Glen, one of the most remarkable of nature's wonders, now a state park.

During the ages the small stream, in making its way from

the hills to Seneca lake, has worn a deep gorge in the soft rock at this point, until now the water tumbles over a series of gorges, some of them nearly 200 feet deep. Sometimes the cut is no more than 10 feet wide, while at others it broadens out into vast amphitheatres, in which the echo of the tourist's voice sounds wierd and almost supernatural. This chasm penetrates the hills for three miles, winding and curving abruptly, and presenting an almost infinite variety of rocky and picturesque scenes.

The return to Binghamton is over the divide into the Susquehanna valley. The country is still picturesque, although by no

Port Crane	7.2	7.2	93.2
Sanitarla Springs	3.4	10.6	89.8
Heiden	6.2	16.8	83.6
Harpuraville	3.6	20.4	80.0
Ninevah	1.7	22.1	78.3
Afton	5.3	27.4	73.0
Bainbridge	5.3	32.7	67.7
Unadilla	10.8	43.5	56.9
Wellsbridge	5.1	48.6	51.8
Otego	4.4	53.0	47.4
Oneonta	8.4	61.4	39.0
Colliers	5.5	66.9	33.5
Milford Center	2.4	69.3	31.1
Portlandville	1.3	70.6	29.8
Milford	4.6	75.2	25.2
Bartwick	4.3	79.5	20.9
Cooperstown	4.3	83.8	16.6
Springfield Center	9.9	93.7	6.7
Warren	3.6	97.3	3.1
Richfield Springs	3.1	100.4	0.0
Richfield Springs-Penn Yan,			
138.6 Miles.			

	Miles to	Total Miles	Out Return
Richfield Springs	0.0	0.0	138.6



One of the Many Interesting Trout Streams in the Foothills of the Catskills.

means as romantic in its beauty as that which has occupied the tourist for the greater portion of three days. The road is excellent, while not of macadam, and good time can be made throughout this portion of the trip.

ITINERARY NO. 53.

Night Stops—Binghamton, Richfield Springs and Penn Yan, N. Y. Three Days,

372.1 Miles.

Binghamton-Richfield Springs, 100.4 Miles.

	Miles to	Total Miles	Out Return
Binghamton	0.0	0.0	100.4

East Winfield ...	9.1	9.1	129.5
West Winfield ...	2.2	11.3	127.3
Bridgewater ...	3.5	14.8	123.8
Sangerfield ...	7.5	22.3	116.3
Madison	6.1	28.4	110.3
Bouckville	3.2	31.6	107.0
Pine Woods	1.2	32.8	105.8
Morrisville	4.3	37.1	101.5
Nelson	3.9	41.0	97.6
Cazenovia	7.1	48.1	90.5
Oran	6.3	54.4	84.3
Manlius	2.9	57.3	81.3
Fayetteville	2.8	60.1	78.5
Syracuse	7.0	67.7	70.9
Camillus	8.3	76.0	62.6
Elbridge	7.2	83.2	55.4
Sennett	5.3	88.5	50.1
Auburn	5.2	93.7	44.9
Seneca Falls ...	12.8	106.5	32.1
Waterloo	3.6	110.1	28.5
Geneva	6.9	117.0	21.6
Flint	7.2	124.2	14.4
Halls Corners ...	6.2	130.4	8.2
Benton Center ...	4.2	134.6	4.0
Penn Yan	4.0	138.6	0.0

Penn Yan-Binghamton, 133.1 Miles.

	Total Miles	
	Miles to	Out Return
Penn Yan	0.0	0.0 133.1
Bluff Point	11.9	11.9 121.2
Branchport	7.8	19.7 113.4
Catawba	8.1	27.8 105.3
Urbana	6.2	34.0 99.1

Hammondsport	4.8	38.8	94.3	Vanetta	9.9	86.1	47.0
Wayne	8.6	47.4	85.7	Spencer	3.3	89.4	43.7
Lake Wauneta	3.9	51.3	81.8	Candor	8.6	98.0	35.1
Weston	0.7	52.0	81.1	Catatonk	6.0	104.0	29.1
Tyronne	1.1	53.1	80.0	Owego	4.5	108.5	24.6
Watkins	9.9	63.0	70.1	Appalachian	8.1	116.6	16.5
Montour Falls	2.3	65.3	67.8	Vestal	6.2	122.8	10.3
Odessa	3.8	69.1	64.0	Endicott	1.1	123.9	9.2
Alpine	4.1	73.2	59.9	Lestershire	5.3	129.2	3.0
Cayuta	3.0	76.2	56.9	Binghamton	3.9	133.1	0.0

PLAY SPOTS IN NEW YORK STATE.

Seven Days Ride Through a Picturesque Country to Delaware Water Gap, Watkins Glen, Saratoga and Lake George.

A SEVEN days trip from New York, which takes in the Delaware Water Gap, the Allegheny and Adirondack mountains, Saratoga Springs and Lake George, returning through Albany, the Catskills and the beautiful Hudson valley, should have its attractions for even the most travelled motorist.

The trip begins in New York City, which the tourist leaves by way of the Weehauken ferry at Forty-second street. It goes through Jersey City and over fine macadam to Newark. Madison is the seat of the Drew Theological seminary, which has been an important institution since 1857.

Morristown, N. J., passed on the first day, is chiefly known as having been the winter quarters of General Washington during the winter of 1779-80, and the old house in which he stayed is still preserved as an historical museum. The town is attractively located near the Wachtung ranges and there are many beautiful drives in its vicinity.

Shortly out of Morristown the road ascends Schooley's mountain, which was once a popular summer resort, overlooking the Musconetcong and German valleys. Crossing the Delaware on a ferry near Hackettstown, the road follows the river north into Delaware Water Gap.

There is a summer village at the gap, with many excursion hotels. The place is visited every summer by thousands of tourists. The gap is formed by the Delaware river breaking through the Kittatinny mountain range, on a sharp turn. On either side the mountains rise abruptly to a height of 1600 feet. They are topped by fine summer hotels. There is supposed, in prehistoric times, to have been a lake behind the mountains, which broke through, digging out the gap on its way.

From the gap the road leads to the summit of Mt. Pocono and across the Pocono mountain plateau. Beyond this the descent of the Alleghenies is made and

the road enters Scranton over a fine boulevard. Scranton is a city in the centre of the great anthracite mining regions and from the road many mines and coal breakers can be seen. Out of Scranton the road leads through valleys with fine mountains on every side. There are many creeks and some well kept and attractive farms. At Hallstead the Susquehanna river is crossed and the road leads into New York state. Shortly beyond this an excellent macadam road begins, which covers the remaining distance into Binghamton.

For about 20 miles out of Binghamton the road follows the beautiful Susquehanna valley and then turns north. The change in the agricultural aspect of the country is immediately apparent. There are evidences of rural prosperity on every side. Over fine dirt roads the tourist goes to Montour Falls and enters the basin of Seneca lake, a sparkling and beautiful sheet of water. There is good macadam from that point to Watkins Glen, which is nationally



Where the Delaware River Has Worn Its Way Through the Kittatinny Mountains at Delaware Water Gap.



Sanburg Creek in the Catskill Foothills, Near Ellenville, N. Y.

famous for its scenic beauty.

Here, within an area of two acres are medicinal springs, brine salt wells, pine groves and from the hill a very remarkable view of Seneca lake is obtainable. The aspect of everything is rural and peaceful. There are many trout in Seneca lake.

Crossing the lake inlet near Watkins village the route runs up Rock Cabin road. As a hill is ascended, red and white marks painted on the cliffs are noted. This indicates a surveyor's mark. With this point as a basis all the surveys in this part of New York have been made since early times. The road passes through the grounds of Cornell university at the head of Cayuga lake in Ithaca. For the rest of the day the route goes through fine farming country. The Unadilla river is crossed and the route goes along the south shore of Canadarago lake, and runs through the basin of Otsego lake.

Cooperstown is at the end of Otsego lake and near the place is a large rock that figures in Cooper's "Leather Stocking Tales." All of these tales were laid in the country surrounding Cooperstown. He called the lake the "Glimmer-glass." All the local names will be familiar to readers of Cooper.

The next day the route skirts the shores of Otsego lake and then cuts across the hills to the Mohawk valley at Fort plain. From here the run goes down this remarkably beautiful valley. Leaving the valley the road goes up a steep hill toward Ballston Spa and

from that point a good macadam road runs to Saratoga, one of the most famous resorts in the country. From here a short run brings the tourist to Lake George, one of the most charming of American lakes.

The next day takes the motorist back over the previous day's run as far as Saratoga and Ballston, and thence through Burnt Hills and Schenectady to Albany. From Albany the tourist goes through Rensselaer, with its magnificent estates, and arrives shortly at Kinderhook.

This is one of the oldest towns in New York state. It was settled about 1600. The name means "Children's Corner." Before the days of the railroads it was one

of the principal towns on the old post road and the 137th milestone is still to be seen near the old cemetery. It was a big retail centre and the old academy was famous throughout the state. There are 10 or more prerevolutionary houses still standing in the village.

The road passes through Red Hook, which is within five miles of the spot where Fulton built the "Clermont." Entering Poughkeepsie the road passes many fine estates—the home of F. W. Vanderbilt, the residence of John Burroughs, the famous naturalist, the estate of William B. Dinsmore, who was formerly president of the Adams Express Company, and the estate of John Jacob Astor.

From the top of a hill up which a cable railroad runs at Fishkill Landing a superb view of the Hudson and the Catskills is obtainable. At Garrison one may take a ferry to West Point, the seat of the United States military academy.

ITINERARY NO. 55.

Night Stops—Delaware Water Gap, Penn.; Watkins, Cooperstown, Sagamore, Albany and New York. Seven Days, 730.8 Miles.

New York-Delaware Water Gap, 80.9 Miles.



Anthony's Nose and Rogers' Rock on the Banks of Lake George, N. Y.



Down the Delaware River in Pennsylvania.

	Miles to	Total Miles Out Return
Weehawken Ferry	0.0	0.0 80.9
Newark	10.6	10.6 70.3
Irvington	2.3	12.9 68.0
Madison	11.0	23.9 57.0
Morristown	6.3	30.2 50.7
Mendham	6.9	37.1 43.8
Chester	5.6	42.7 38.2
German Valley	4.7	47.4 33.5
Hackettstown	6.4	53.8 27.1
Vlenna	3.9	57.7 23.2
Danville	1.5	59.2 21.7
Buttsville	6.3	65.5 15.4
Bridgeville	1.2	66.7 14.2
Delaware	5.6	72.3 8.6
Myers Ferry	0.4	72.7 8.2
Portland, Penn.	2.9	75.6 5.3
Delaware Water Gap	5.3	80.9 0.0

Delaware Water Gap-Binghamton, 112 Miles.

	Miles to	Total Miles Out Return
Delaware Water Gap	0.0	0.0 112.0
Stroudsburg	3.6	3.6 108.4
Mt. Pocono	16.3	19.9 92.1
Tobyhanna	5.0	24.9 87.1
Gouldsboro	5.6	30.5 81.5
Scranton	22.2	52.7 59.3
Providence	2.8	55.5 56.5
Clark's Summit	4.8	60.3 51.7
Wallsville	6.5	66.8 45.2
Glenwood	6.3	73.1 38.9
Hartford	10.3	83.4 28.6
New Milford	7.2	90.6 21.4
Broad Bend, Penn.	6.8	97.4 14.6
Kirkwood, N. Y.	5.6	103.0 9.0
Binghamton	9.0	112.0 0.0

Binghamton-Watkins Glen, 70.1 Miles.

	Miles to	Total Miles Out Return
Binghamton	0.0	0.0 70.1
Vestal	10.3	10.3 59.8
Owego	14.3	24.6 45.5
Candor	10.5	35.1 35.0
Van Etten	11.9	47.0 23.1
Cayuta	9.9	56.9 13.2
Alpine	3.0	59.9 10.2
Odessa	4.1	64.0 6.1
Watkins Glen	6.1	70.1 0.0

Watkins Glen-Cooperstown, 126.2 Miles.

	Miles to	Total Miles Out Return
Watkins Glen	0.0	0.0 126.2
Montour Falls	2.8	2.8 123.4
Odessa	3.2	6.0 120.2
Alpine	3.9	9.9 116.3
Ithaca	17.8	27.7 98.5
Varna	3.9	31.6 94.6
Willow Glen	5.2	36.8 89.4
Dryden	2.5	39.3 86.9
Cortland	10.1	49.4 76.8
Truxton	11.4	60.8 65.4
De Ruyter	8.2	69.0 57.2
Ontario	10.6	79.6 46.6
Smyrna	8.6	88.2 38.0
Edmeston	18.0	106.2 20.0
Burlington	6.7	112.9 13.3
Fly Creek	7.6	120.5 5.7
Cooperstown	5.7	126.2 0.0

Cooperstown-Sagamore, 120.4 Miles.

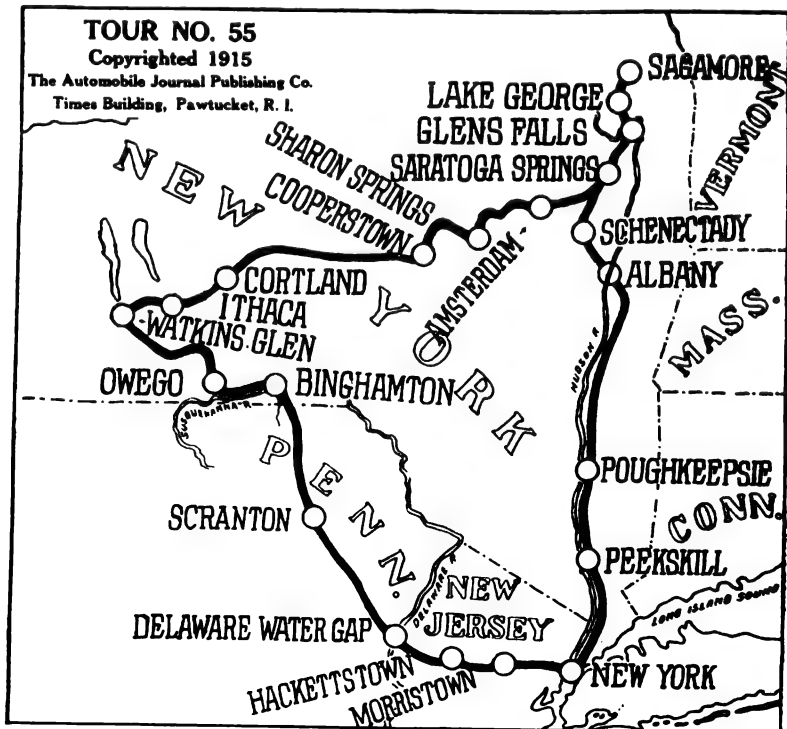
	Miles to	Total Miles Out Return
Cooperstown	0.0	0.0 120.4
Springfield	10.3	10.3 110.1
Cherry Valley	6.6	16.9 103.5
Sharon Springs	7.0	24.5 95.9
Ames	3.7	28.2 92.2
Cannoharie	6.5	34.7 85.7
Palatine Bridge	0.5	35.2 85.2
Fonda	11.4	46.6 73.8
Tribes Hill	8.9	55.5 64.9
Amsterdam	1.8	57.3 63.1
Ballston	22.2	79.5 40.9
Saratoga	6.7	86.2 34.2
S. Glens Falls	18.4	104.6 15.8
Glens Falls	0.7	105.3 15.1
Lake George	9.1	114.4 6.0
Sagamore, N. Y.	6.0	120.4 0.0

Sagamore-Albany, 71.9 Miles.

	Miles to	Total Miles Out Return
Sagamore	0.0	0.0 71.9
Lake George	6.0	6.0 65.9
Glens Falls	9.2	15.2 56.7
S. Glens Falls	0.7	15.9 56.0
Saratoga	18.4	34.3 37.6
Ballston	6.7	41.0 30.9
Burnt Hills	7.6	48.6 23.3
Schenectady	8.3	56.9 15.0
Albany	15.0	71.9 0.0

Albany-New York City, 149.3 Miles.

	Miles to	Total Miles Out Return
Albany	0.0	0.0 149.3
Rensselaer	1.0	1.0 148.3
Schoharie Center	6.2	7.2 142.1
Kinderhook	13.4	20.6 128.7
Stuyvesant Falls	3.8	24.4 124.9
Stockville	5.3	29.7 119.6
Hudson	3.4	33.1 116.2
Blue Store	10.2	43.3 106.0
Upper Red Hook	6.5	49.8 99.5
Red Hook	2.5	52.3 97.0



Rhinebeck	5.9	58.2	91.1	Flashkill Landing	6.1	89.7	59.6	Ossining	2.7	120.0	29.3
Hyde Park	10.3	68.5	80.8	Cold Spring	7.0	96.7	52.6	Tarrytown	5.2	125.2	24.1
Poughkeepsie ...	6.0	74.5	74.8	Peekskill	12.0	108.7	40.6	Yonkers	12.2	137.4	11.9
Wappinger Falls	7.7	82.2	67.1	Croton-on-Hud-				New York, N. Y.	11.9	149.3	0.0
Hughsonville ...	1.4	83.6	65.7	son	8.6	117.3	32.0				

TWO DAYS ON PICTURESQUE LONG ISLAND.

From Long Island City to Greenport the Route Covers Both Sides of the Island—
Touches Countless Resorts and Passes Fine Estates.

LONG ISLAND is, perhaps, the chief summer playground of the people of New York City. It abounds with summer homes of all degrees of elaborateness and simplicity—from the magnificent estate of W. K. Vanderbilt at Oakdale to the simple cottages of people in moderate circumstances.

It has splendid beaches, fronting on both the Atlantic and the sound, and many coves and bays, which make it an ideal place for yachtsmen and the devotees of small boats. The finest oysters and clams are gathered along its shores. Blue Point has given its name to famous grade of oysters, and Little Neck has done the same for clams.

In the interior there are beautiful hills, fine golf courses, sparkling fresh water lakes, several of which offer unexcelled opportunities for boating and water sports. There are charming bridle paths and roads shaded with cool and inviting green.

New York people know Long Island well and it is probably the first touring round of the New York City automobilist. It is not so well known, however, to New Englanders and to visitors from other parts of the country.

Those from the West will doubtless approach it through the metropolis and for that reason the routes given begin and end at New York City, but it is easily accessible to tourists from New England. They may reach it by ferry boats across the sound, operating either from Bridgeport or New London.

The island is a little more than 200 miles in circumference, as the road goes so that it provides two days of excellent driving. The roads are as good as can be found anywhere, hard, smooth and amply wide. They are made chiefly

of macadam, gravel and shell.

The tourist leaves New York over the Queensborough bridge, directly east from Columbus circle. The centre of the bridge rests on Blackwell's island and the prison buildings are visible just below on either side. The tourist descends the long approach into Long Island city and here the route, as given, begins.

It goes through Jamaica, a flourishing town in the borough of Queens, and then out through

are Westhampton beach and Canoe place. This latter will be identified by a wooden image in front of the village inn.

Crossing a canal the road runs to Shinnecock Hills. There is a large and finely equipped golf club here and the road passes the outskirts of the reservation of the Shinnecock Indians. Lake Agawam is a very beautiful sheet of water near Southhampton and it is well worth while for the tourists to make the short run about



One of the Long Island Lakes.

Freeport and Babylon. The next town is Bay Shore, a fashionable watering place, from which steamers may be taken to Fire Island. From here on, fine estates, many of them very large and of great value, are passed.

Patchogue is one of the most populous of the summer cities on the island. Thousands come here every year for their summer vacations. Along the shore the road passes Blue Point, famous for its oyster grounds, and among the myriad summer resorts beyond

the roads along its shores.

There are many picturesque windmills here. Almost every foot of the territory has been pictured by the landscape artists of New York and hundreds of places will be recognized by those who are familiar with the American art of the last half century.

Easthampton was the home of John Howard Payne and Dr. Lyman Beecher. If the tourist desires, a side trip may be made to Mantauck Point, another famous resort. At Sag Harbor a ferry is



Montauk Point Light, at the Extreme End of Long Island.

taken to Shelter Island, upon which there are many very beautiful drives. From Shelter Island heights another ferry carries the tourist to Greenport, the end of the day's run. From Sag Harbor, Shelter Island and Greenport boats are available to New London or Bridgeport.

The north side of the island is interesting and well developed, but not so populous as the Atlantic side. Some of the roads along this shore are of dirt, but are in good condition.

The road goes west, passing within a mile of the shore of Great Peconic bay, and at Riverhead goes through a quaint little park with an interesting water tower.

One of the curiosities of the run is Nicola Tesla's great experimental electrical tower. At Port Jefferson another ferry is available to Bridgeport.

ITINERARY NO. 56.

Night Stops—Greenport, New York. Two Days, 218.5 Miles.

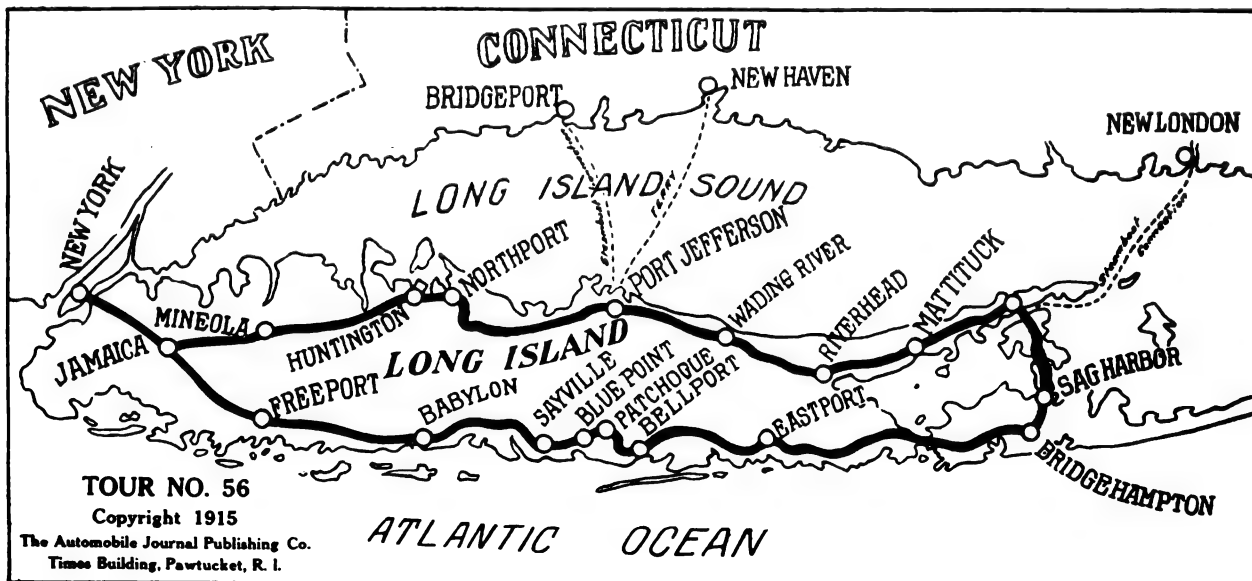
New York City-Greenport, 115.1 Miles.

	Miles to	Total Miles
Long Island City	0.0	0.0 115.1
Jamaica	8.8	8.8 106.3
Springfield	2.9	11.7 103.4

Valley Stream	2.7	14.4	100.7
Lynbrook	1.9	16.3	98.8
Rockville Center	1.3	17.6	97.5
Baldwin	1.9	19.5	95.6
Freeport	1.7	21.2	93.9
Merrick	1.6	22.8	92.3
Amityville	7.2	30.0	85.1
Babylon	5.5	35.5	79.6
Bay Shore	4.8	40.3	74.8
Islip	1.8	42.1	73.0
Oakdale	4.9	47.0	68.1
Sayville	3.1	50.1	65.0
Bayport	1.5	51.6	63.5
Blue Point	1.7	53.3	61.8
Patchogue	1.8	55.1	60.0
Bellport	4.3	59.4	55.7
Moriches	7.8	67.2	47.9
East Port	6.6	73.8	41.3
West Hampton			
Beach	5.4	79.2	35.9
Quogue	3.1	82.3	32.8
Good Ground	7.3	89.6	25.5
Southampton	6.1	95.7	19.4
Bridgehampton	6.3	102.0	13.1
Sag Harbor	5.3	107.3	7.8
Shelter Island	5.5	112.8	2.3
Greenport Ferry	2.2	115.0	0.1
Greenport	0.1	115.1	0.0

Greenport-New York City, 103.4 Miles.

	Miles to	Total Miles
Greenport	0.0	0.0 103.4
Southold	4.7	4.7 98.7
Peconic	3.3	8.0 95.4
Cutchogue	1.7	9.7 93.7
Matituck	3.0	12.7 90.7
Jamesport	4.0	16.7 86.7
Riverhead	5.4	22.1 81.3
Wading River	11.0	33.1 70.3
Miller's Place	8.6	41.7 61.7
Port Jefferson	4.7	46.4 57.0
E. Setauket	1.8	48.2 55.2
Stony Brook	3.5	51.7 51.7
St. James	2.3	54.0 49.4
Commack	8.3	62.3 41.1
Northport	3.9	66.2 37.2
Centerport	3.2	69.4 34.0
Huntington	3.2	72.6 30.8
E. Norwich	6.4	79.0 24.4
Roslyn	6.8	85.8 17.6
Manhasset Hills	2.9	88.7 14.7
Little Neck	2.7	91.4 12.0
Bayside	1.9	93.3 10.1
Flushing	3.5	96.8 6.6
Corona	1.9	98.7 4.7
Long Island City	4.7	103.4 0.0



THROUGH THE PENNSYLVANIA MOUNTAINS.

From Philadelphia to Pittsburg Via Reading, Harrisburg and Hollidaysburg, Thence to Buffalo Returning Via Wilkes Barre—A Nine Days' Tour of Interest

FOR the tourist who has made the trip from Philadelphia to Pittsburg via the main route, which is that of the Lincoln highway leading through Gettysburg, a pleasing variation is possible, as given in Itinerary No. 60. This takes the tourist over some excellent roads, many of which have recently been improved by the state highways commission.

This route touches Harrisburg, where a visit may be made to the capital of the state, and introduces the traveller to some of the finest river and mountain scenery in Pennsylvania.

From Philadelphia there is a good stone road through Norristown, Pottsville and Reading. There a sharp turn is made to the west and the route follows another stone road through Wernersville, which is noted for its sanatoriums. Here a modern turn pike begins, which continues through Humelstown, Lebanon and along the picturesque valley of the Lebanon river.

New road in the best of condition runs from a point just west of Humelstown to Harrisburg. Harrisburg is chiefly interesting for the state capitol building, which is acknowledged to be a remarkable piece of architecture, notwithstanding the scandals that followed its erection.

North along the beautiful Susquehanna river from Harrisburg to Clark's Ferry the views are remarkable in their beauty. At Clark's Ferry the river is crossed and the route continues north again on the other bank to Liverpool. There is a hard dirt road from Liverpool to Mifflintown, and from Mifflintown one of the finest highways in Pennsylvania runs to Lewistown. This goes through Millerstown and follows the banks of the Juniata river. This piece of construction is one of much interest to highway engineers, as great difficulties had to be overcome before it could be completed.

From Lewistown one of the many toll roads of the state leads

westward to Kiskacoquilla, from which point another new road leads through Mechanicsville to Mill Creek. Five miles of unimproved road intervene before the traveller strikes another new road from Huntingdon to Cresson by way of Water street to Hollidaysburg.

From Hollidaysburg to Pittsburg the roads are not the best the tourist is acquainted with, but the fine mountain views more than repay the traveller for the slight difficulties under which the car is placed.

Pittsburg is the centre of the steel and iron trade in the United States and has been called the Smoky City. It was first settled in 1753 by the French, who built a line of forts along the Ohio and Allegheny rivers. The one at this point was called Fort Duquesne. This was destroyed in 1758 and later was succeeded by Fort Pitt. The town of Pittsburg dates from 1765. Its great commercial development arose from the fact that it is the centre of the richest coal mining district in the world, and it was thought cheaper to

bring iron ore and other material to fuel than to take the fuel to the iron.

Allegheny was formerly a separate city on the other side of the river, but it has been incorporated with Pittsburg. The city contains the Phipps Conservatory, one of the finest in the world, the Carnegie institute and the Carnegie library.

From Pittsburg there are some fine river and mountain views as far as Butler and then the traveller goes through a section of the famous Pennsylvania oil and coal country. The night stop is Sheffield. Beyond Warren the traveller comes upon Chataqua lake. The lake is 20 miles long and although it is only seven miles from Lake Erie, it is 720 feet below the level of that lake and its waters run southward to the Gulf of Mexico.

Among the several well known resorts on the lake, the best known is Chataqua, which has given its name to the system of lectures and entertainments which have been extended to every part of the country. Here every sum-



One of the Many Pennsylvania Toll Gates at Charmion.



State Line Hill on the Way from Buffalo, N. Y., to Erie, Penn.

mer students assemble to devote their time to literature and science.

Jamestown, at one end of the lake, is not far from Celeron, a large resort resembling those on the seashore. Bathing, boating and fishing are the chief amusements. All of the many resorts on the lake are connected by steamboat lines.

From Westfield to Buffalo the route is a part of the main road system along the south shore of Lake Erie and of the most heavily travelled route from Boston to Chicago.

Buffalo was once the largest

city on the great lakes and is still very busy and prosperous, with a population close to 500,000, although it has been surpassed in size by both Cleveland and Detroit. It owed its early importance to the fact that it was the northern terminus of the Erie canal and the eastern terminus of great lake shipping. The development of the railroads has been against it.

At Buffalo a turn is made back toward Philadelphia. The route touches at Silver Springs on Silver lake, the most westerly of the many New York lakes which have been converted into summer play-

grounds for vacationists.

Portage, N. Y., took its name from the fact that the Indians were compelled to carry their canoes around three separate falls in the Genesee river. A fine bridge has replaced the portage at such a height that an excellent view of all three falls is afforded.

Danville, N. Y., is the centre of a country devoted to the growing of hops and for miles on every side there are hop fields along the road. Not much further on the tour enters the splendid vineyards in the valley of the Canisteo. The vineyards continue all the way to Elmira.

Beyond Bath is Corning, where much of the cut glass sold in the American market is made. The road enters Elmira after a run along an excellent macadam road in the Chemung valley.

Elmira became an established settlement about 1788. It was incorporated as the village of Newton in 1815, and the name was changed to Elmira in 1828. It is the seat of Elmira college and of the New York state reformatory. There are many large industries located here also.

Beyond Elmira the route runs along the Pennsylvania line before it is finally crossed at Athens. From this point the Allegheny mountains are again visible. The tourist sees the beauties of the Susquehanna river, though at a point much nearer its source than that at which he first made its ac-



Eagles Mere, a Beautiful Lake and State Park of Virgin Forest Within Easy Driving Distance of Wilkes Barre.

quaintance near Harrisburg.

The Lehigh Valley railroad winds in and out among the mountain peaks in a striking way. The views all along here are of the greatest interest, but perhaps reach their climax at Tunkhannock.

The night stop is Wilkes Barre, located in the Wyoming valley. This is a leading shipping point for the rich anthracite coal district. A short distance to the east is "The Lake of Eagles," which is 2200 feet above the sea level, in the heart of a still primitive forest. It is 1.5 miles long and one

the best that can be chosen by those who wish to become familiar with that great mountain range. Touching Buffalo it gives an opportunity for a side trip to Niagara Falls, and introduces the stranger in those parts to the great system of shipping on the lakes. The interest supplied by the Pittsburg district is naturally very great.

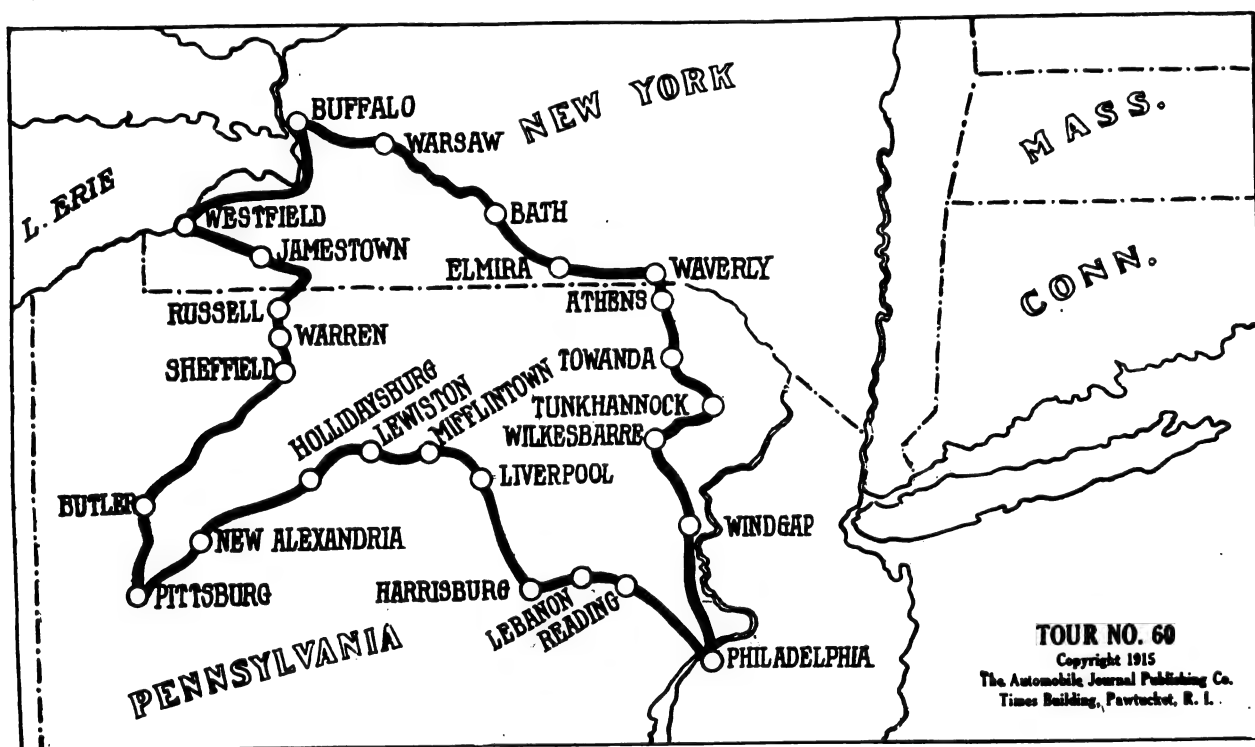
ITINERARY NO. 60.

Night Stops—Philadelphia, Harrisburg, Hollidaysburg,

Reading	8.4	54.9	53.4
Sinking Spring...	4.9	59.8	49.5
Lebanon	22.9	82.7	25.6
Hummelstown ..	16.1	98.8	9.5
Harrisburg	9.5	108.3	0.0

Harrisburg-Hollidaysburg,
129.7 Miles.

	Miles to	Total Miles	Out Return
Harrisburg	0.0	0.0	129.7
Clark's Ferry...	14.5	14.5	115.2
Millerstown	17.8	32.3	97.4
Millintown	15.1	47.4	82.3
Lewistown	12.1	59.5	70.2
Huntingdon	37.4	96.9	32.8
Williamsburg	19.8	116.7	13.0
Hollidaysburg ..	13.0	129.7	0.0



mile wide and not more than 60 feet deep. Clean sloping white sand beaches allow ample opportunity for bathing.

Onward toward Philadelphia the Pocono mountains are encountered. This is one of the groups which is given the general name of Blue Ridge. They have an average height of 2000 feet, with sheer and heavily wooded slopes. The latter part of the route goes through the Delaware valley and from Windgap a trip of six miles to the northeast will bring the traveller to Delaware Water Gap.

This route crossing the Alleghenies twice, as it does, is one of

Pittsburg and Sheffield, Penn.; Buffalo and Elmira, N. Y.; Wilkesbarre, Penn. Eight Days, 974.6 Miles.

Philadelphia-Harrisburg (via Reading), 108.3 Miles.

	Miles to	Total Miles	Out Return
Philadelphia	0.0	0.0	108.3
Wissahickon	6.3	6.3	102.0
Norristown	10.8	17.1	91.2
Jeffersonville	2.4	19.5	88.8
Collegeville	5.5	25.0	83.3
Trappe	1.9	26.9	81.4
Limerick	3.4	30.3	78.0
Sanatoga	3.7	34.0	74.3
Pottstown	2.9	36.9	71.4
Douglasville	4.8	41.7	66.6
Baumtown	4.8	46.5	61.8

Hollidaysburg-Pittsburg, 92.7 Miles.

	Miles to	Total Miles	Out Return
Hollidaysburg	0.0	0.0	92.7
Duncansville	1.3	1.3	91.4
Summit	9.1	10.4	82.3
Cresson	0.7	11.1	81.6
Ebensburg	7.8	18.9	73.8
Armagh	19.2	38.1	54.6
Clyde	2.4	40.5	52.2
Blairsville	10.9	51.4	41.3
New Alexandria	8.2	59.6	33.1
Salemville	1.3	60.9	31.8
Delmont	6.6	67.5	25.2
Monroeville	11.6	79.1	13.6
Wilkinsburg	6.6	85.7	7.0
Pittsburg	7.0	92.7	0.0

Pittsburg-Sheffield, 133.9 Miles.

	Miles to	Total Miles	Out Return
Pittsburg	0.0	0.0	133.9

Undercliff	10.7	10.7	123.2
Connersville	12.6	23.3	110.6
Saxonburg	7.4	30.7	103.2
Harmanton	2.1	32.8	101.1
Butler	9.1	41.9	92.0
Chicora	11.3	53.2	80.7
Kaylor	5.2	58.4	75.5
East Brady	4.5	62.9	71.0
Rimersburg	8.2	71.1	62.8
Curllsville	5.2	76.3	57.6
Reedsburg	4.9	81.2	52.7
Clarion	5.2	86.4	47.5
Lucinda	9.5	95.9	38.0
Snydersburg	1.8	97.7	36.2
Leeper	3.8	101.5	32.4
McDonald's	4.9	106.4	27.5
Marlenville	7.0	113.4	20.5
Sheffield	20.5	133.9	0.0

Sheffield-Elmira, 118.4 Miles.

		Total Miles	
		Miles to	Out Return
Sheffield	0.0	0.0	118.4
Warren	12.6	12.6	105.8
North Warren	2.2	14.8	103.6
Russell, N. Y.	5.1	19.9	98.5
Jamestown	13.4	33.3	85.1
Stow	11.4	44.7	73.7
Chautauqua	5.2	49.9	68.5
Mayville	3.9	53.8	64.6
Westfield	5.4	59.2	59.2
Portland	6.9	66.1	52.3
Brocton	1.4	67.5	50.9
Fredonia	6.8	74.3	44.1
Sheridan	6.0	80.3	38.1
Silver Creek	5.9	86.2	32.2
Irving	3.4	89.6	28.8
Evans	7.6	97.2	21.2
Buffalo	21.2	118.4	0.0

Buffalo-Elmira, 154.6 Miles.

		Total Miles	
		Miles to	Out Return
Buffalo	0.0	0.0	154.6
Ebenezer	8.0	8.0	146.6
East Aurora	9.6	17.6	137.0

Wales Center....	4.2	21.8	132.8
Harris	4.4	26.2	128.4
North Sheldon....	2.8	29.0	125.6
Varysburg	4.2	33.2	121.4
Orangeville	3.4	36.6	118.0
Hall's Corners....	2.7	39.3	115.3
Warsaw	3.3	42.6	112.0
South Warsaw....	3.0	45.6	109.0
Rock Glen.....	1.0	46.6	108.0
Silver Springs....	2.8	49.4	105.2
Chace	1.3	50.7	103.9
Castile	2.6	53.3	101.3
Portageville	6.5	59.8	94.8
Hunts	4.3	64.1	90.5
Dalton	2.0	66.1	88.5
Swains	7.6	73.7	80.9
Garwoods	1.8	75.5	79.1
Canaseraga	2.3	77.8	76.8
Danaville	7.7	85.5	69.1
Perkinaville	4.3	89.8	64.8
Cohocton	8.8	98.6	56.0
Avoca	7.6	106.2	48.4
Kanona	4.2	110.4	44.2
Bath	3.8	114.2	40.4
Savona	6.5	120.7	33.9
Campbell	4.5	125.2	29.4
Coopers	5.2	130.4	24.2
Painted Post....	3.0	133.4	21.2
Corning	2.6	136.0	18.6
Big Flats	7.1	143.1	11.5
Elmira Heights..	8.3	151.4	3.2
Elmira	3.2	154.6	0.0

Elmira-Wilkesbarre, 108.6 Miles.

		Total Miles	
		Miles to	Out Return
Elmira	0.0	0.0	108.6
Wellsburg	6.9	6.9	101.7
Chemung	7.2	14.1	94.5
Waverly	4.5	18.6	90.0
Athens, Penn....	3.6	22.2	86.4
Uster	8.1	30.3	78.3
Towanda	8.1	38.4	70.2

Wysox	2.6	41.0	67.6
Standing Stone..	4.2	45.2	63.4
Rummerfield	2.9	48.1	64.5
Wyalusing	7.1	55.2	53.4
Laceyville	8.4	63.6	45.0
Meshoppen	7.4	71.0	37.6
Russell Hill	3.7	74.7	33.9
Tunkhannock	5.3	80.0	28.6
Peterboro	8.5	88.5	20.1
Bowman Creek..	2.9	91.4	17.2
Beaumont	2.1	93.5	15.1
Kunkle	2.4	95.9	12.7
Dallas Station....	3.2	99.1	9.5
Luzerne	6.4	105.5	3.1
Wilkesbarre	3.1	108.6	0.0

Wilkesbarre-Philadelphia, 128.4 Miles.

		Total Miles	
		Miles to	Out Return
Wilkesbarre	0.0	0.0	128.4
Ashville Plains..	5.2	5.2	123.2
Fairview	1.5	6.7	121.7
Bear Creek	10.0	16.7	111.7
Stoddardsville....	9.2	25.9	102.5
Blakeslee	2.1	28.0	100.4
Pocoyo	4.3	32.3	96.1
Effort	9.8	42.1	86.3
Broadheads ville..	2.7	44.8	83.6
Snydersburg	6.0	50.8	77.6
Windgap	2.6	53.4	75.0
Windgap Village	2.4	55.8	72.6
Belfast	4.3	60.1	68.3
Nazareth	5.0	65.1	63.3
Bethlehem	9.6	74.7	53.7
Coopersburg	8.3	83.0	45.4
Quakertown	6.1	89.1	39.3
Sellersville	6.5	95.6	32.8
Montgomeryville..	9.2	104.8	23.6
Springhouse	4.6	109.4	19.0
Ambler	2.3	111.7	16.7
National Ceme- tery	8.7	120.4	8.0
N. Philadelphia..	5.0	125.4	3.0
Philadelphia	3.0	128.4	0.0

AROUND THE STATE OF NEW JERSEY.

A Tour Circling the State and Touching at Long Branch, Atlantic City, Cape May and Other Large Summer Resorts Before It Reaches Camden and Philadelphia.

NEW JERSEY summer resorts on the Atlantic coast are the largest and most developed of any along the eastern seaboard. Their fame, and particularly that of Atlantic City, is more than national. They attract thousands every year from all parts of the country East and West.

Many motorists will wish to reach them either from New York or Philadelphia, and for that reason a route has been chosen between those cities which follow the coast line as nearly as the many bays and indentations permit.

From New York to Atlantic City the route is not by any means the shortest one, but it has the great advantage of taking the tourist to practically every resort

of prominence along the coast.

The tourist may leave New York by crossing into New Jersey and running through Newark, Elizabeth and Perth Amboy to South Amboy or he may go by ferry to Staten Island, across Staten Island, and by ferry again to South Amboy.

From South Amboy the route follows the shores of Raritan bay to Keyport. Near Freehold is an imposing granite monument, commemorating the Battle of Monmouth, fought June 28, 1778.

Red Bank, on the Navesink river, is a famous rendezvous for yachtsmen. Long Branch was once one of the most famous watering resorts in America. It derives its name from the "long branch" of the Shrewsbury river

which enters the sea nearby.

Its rise to great fame was due partly to the fact that during President Grant's administration it was the summer capital. President Garfield died in his cottage at Elberton, near by. Asbury park is another very well known summer resort and not far from it is Ocean Grove, which is also well known. This was once a Methodist meeting ground and is still the summer headquarters of bishops and deacons. No intoxicating liquors are allowed on the grounds and on Sundays all transactions of whatever nature are forbidden.

Lakewood is a very popular summer and winter resort among the New Jersey pines. There are many fine walks through the

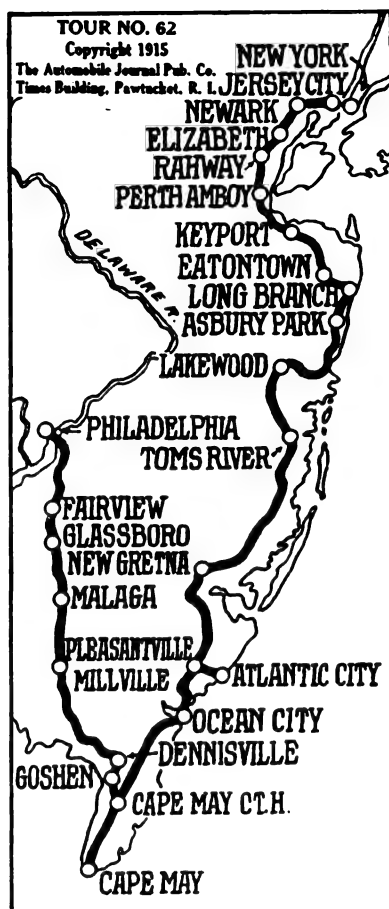
woods and two beautiful lakes, Carylajo and Maneta. There are many great estates in the neighborhood. The famous Lakewood links are laid out on the grounds of Georgian court, the estate of George Gould.

Atlantic City, the greatest of all American summer resorts, which often on busy days in the middle of the summer entertains as many as 300,000 visitors, is on Absecon Island, separated from the mainland by a string of salt marshes. It has nearly 1000 hotels. Besides the world famous board walk, there are five great piers. Cape May has board walks and amusement piers.

ITINERARY NO. 62.

Night Stops—New York City, Atlantic City and Cape May, N. J.; Philadelphia, Penn. Three Days, 288.1 Miles. New York-Atlantic City, 153.5 Miles.

	Miles to	Total Miles
	Out	Return
New York	0.0	0.0 153.5
Newark	8.9	8.9 144.6
Elizabeth	6.2	15.1 138.4
Rahway	5.6	20.7 132.8
Perth Amboy	7.5	28.2 125.3
South Amboy	4.1	32.3 121.2
Keyport	6.0	38.3 115.2
Middletown	6.1	44.4 109.1
Red Bank	4.9	49.3 104.2
Shrewsbury	1.9	51.2 102.3
Eatontown	1.6	52.8 100.7
Long Branch	4.6	57.4 96.1
West End	1.6	59.0 94.5
Elberon	1.7	60.7 92.8
Deal	1.4	62.1 91.4



Allenhurst	1.0	63.1	90.4
Ashbury Park	1.2	64.3	89.2
Ocean Grove	0.9	65.2	88.3
Bradley Beach	0.5	65.7	87.8
Avon	1.0	66.7	86.8
Belmont	0.7	67.4	86.1

Spring Lake	1.6	69.0	84.5
Seagirt	1.7	70.7	82.8
Manasquan	1.0	71.7	81.8
Brielle	1.0	72.7	80.8
Pt. Pleasant	1.6	74.3	79.2
Burrsville	4.4	78.7	74.8
Lakewood	5.3	84.0	69.5
Toms River	10.0	94.0	59.5
Bayville	4.4	98.4	55.1
Barnegat	12.0	110.4	43.1
Manahawken	4.8	115.2	38.3
Tuckerton	7.7	122.9	30.6
New Gretna	6.7	129.6	23.9
Port Republic	6.7	136.3	17.2
Oceanville	4.4	140.7	12.8
Absecon	3.5	144.2	9.3
Atlantic City	9.3	153.5	0.0

Atlantic City-Cape May, 48.1 Miles.

	Miles to	Total Miles
	Out	Return
Atlantic City	0.0	0.0 48.1
Pleasantville	5.3	5.3 42.8
Ocean City	9.6	14.9 33.2
Seaville	9.7	24.6 23.5
Ocean View Station	2.2	26.8 21.3
Cape May Courthouse	8.8	35.6 12.5
Rio Grande	5.9	41.5 6.6
Cape May	6.6	48.1 0.0

Cape May-Philadelphia, 85.5 Miles.

	Miles to	Total Miles
	Out	Return
Cape May	0.0	0.0 85.5
Cape May Courthouse	13.1	13.1 72.4
Dennisville	8.9	22.0 63.5
Eldora	5.0	27.0 58.5
Leesburg	6.2	33.2 52.3
Mauricetown	4.1	37.3 48.2
Millville	9.5	46.8 38.7
Vineland	6.5	53.3 32.2
Malaga	5.7	59.0 26.5
Franklinville	3.4	62.4 23.1
Clayton	2.6	65.0 20.5
Glassboro	2.7	67.7 17.8
Hurricaneville	4.6	72.3 13.2
Westville	7.7	80.0 5.5
Gloucester	0.9	80.9 4.6
Camden	4.6	85.5 0.0
Philadelphia	0.0	85.5 0.0



Atlantic City Possesses One of the Best Known Bathing Beaches and Recreation Spots in America.

FOLLOWING THE NEW DIXIE HIGHWAY.

This Route from Chicago to Southern Florida Is to Be Made One of the Leading Touring Highways—Much to Interest on Route.

THE successful promotion of the Lincoln highway has led to the formation of many organizations in various parts of the country to bring about the improvement of main trunk roads. The people of the South have been very active in this movement. They have recently launched, with every prospect of success, a campaign to secure an improved automobile road from Chicago to Miami, Florida.

Although this association is so new that the exact route over which the highway will pass has only recently been definitely decided, and is not yet entirely open,

formed the course of the Cobe cup race some years ago.

The first night stop is Lafayette, Ind., the seat of Purdue university, a pleasant college town in the centre of a rich Indiana agricultural district.

A short run from Lafayette to Indianapolis, over the best of roads, will allow the tourist most of the day to see the many interesting things in the Hoosier capital. The great Soldiers' monument in the centre of the city, 285 feet high, will prove of interest, as will the remarkable interurban trolley car traffic which centres at a great station in the city.

bert J. Beveridge, Former Vice President Fairbanks, Meredith Nicholson, the novelist; Booth Tarkington and James Whitcomb Riley, the "Hoosier Poet."

Through a number of prosperous towns, centres of a rich agricultural country, the next day's route leads to Louisville. This city was settled in revolutionary times by General George Rogers Clark and was named Louisville in 1778 in honor of King Louis of France, because of assistance given by him to the American colonists in their struggle with England.

President Taylor lived here after he had retired and his tomb is to be seen near the city. There are many fine parks and some excellent driveways, many of which were built as speedways for the famous Kentucky horses.

On the way from Louisville to Mammoth Cave the tourist passes through Buffalo, Ky., and from here a side trip of a few miles will bring him to the Lincoln farm. This is the birthplace of Abraham Lincoln and has been made a national park by the government. Fairview, the home of Jefferson Davis, who was also born in Kentucky, is not much farther to the south.

Mammoth Cave with its underground lakes and curious crystal rock formations is one of the wonders of the world. Many tourists will wish to spend a day exploring its fastnesses. The road from Mammoth Cave to Nashville is not good and it will require a sturdy car and a good set of tires to get through, but with care it can be successfully covered.

In Nashville there are to be seen the tomb of President Polk and the "Hermitage," which was for many years the home of Andrew Jackson. This is 12 miles from the city on the Lebanon pike.

From Nashville the route follows very closely the course of the Union armies in the Civil War.



Scene Along the White River Near Indianapolis.

passable roads from Chicago to Miami are already available. Any motorist can make the trip with the assurance that he will see and enjoy the points of greatest interest which the new trunk line will touch.

Leaving Chicago the road goes south through the fine farming land of Illinois and Indiana, most of the way on very good roads, with occasional stretches of sand and less improved highway. Shortly out of Chicago it passes Cedar lake, which is well known to most Chicago automobilists, and runs over some of the roads that

There are many fine automobile plants to be visited. But perhaps the most advertised thing in the city and the one that has brought Indianapolis more to the notice of the world than any other, is the great motor speedway, where every year the world's greatest automobile race is contested. This is about eight miles from the centre of the city on the Crawfordsville pike. It is a 2½-mile track, built entirely of brick, and it cost \$500,000.

In the fine residence district on the north side will be found the homes of Former Senator Al-

As far as Atlanta it takes almost directly the roads used on Sherman's famous march to the sea.

At Murfreesboro are still to be seen remnants of the fortifications that were erected there for the famous two-day battle. In the towns through which the road passes there is a "Soldiers' Monument" in nearly every one and this is invariably a Confederate memorial.

Chattanooga is a point of great interest to students of the Civil War, for here after his triumph over the western Confederate armies at Vicksburg, Grant defeated the central armies and established the prestige that led to his being named the commander-in-

men who fell there.

Atlanta, the thriving industrial capital of the southeastern states, will be found to be a very modern city of skyscrapers, which has many interesting memorials of the South before the war. From Atlanta to Macon the roads are very good. Here the course strikes off from that followed by Sherman and his men and cuts south across country to the Florida coast.

From Atlanta to Jacksonville it is 300 miles and it is impossible with the best of cars to make the distance in less than two days. There are no cities of considerable size between the two points and it is necessary to make the night stops in country hotels. These

From Ormond and Daytona a short day's run brings the traveler to Rockledge, another to Fort Pierce and on the third he passes through Palm beach, most famous of all Florida winter resorts, and arrives at Miami, the terminus of the route.

ITINERARY NO. 102.

Night Stops—Lafayette, Indianapolis, Ind.; Louisville, Mammoth Cave, Ky.; Nashville, Chattanooga, Tenn.; Atlanta, Cordele, Ga.; Jacksonville, Daytona, Rockledge, Fort Pierce, Miami,



Indicating Character of Roads to Be Encountered in Vicinity of Savannah, Ga., and the Typical Southern Foliage.

chief of all the Union forces.

The town is located in a valley completely surrounded by mountains. And through this valley the Tennessee river winds and twists. Near the town is the famous Lookout mountain, the scene of a bloody civil war battle.

A boulevard leads from the centre of the city to Missionary ridge, where a fine stretch of government road begins. This road is lined with some splendid monuments, much more elaborate, although not quite as numerous, as those at Gettysburg. The road leads to the battlefield of Chickamauga, now a national reservation. Here again is a splendid collection of monuments for the

are available at Cordele, Ga., 157 miles from Atlanta, and at Valdosta, 90 miles further on. The small towns between have few or no regular hotels, but it is of course possible to secure accommodation in private establishments.

The tourist is now on the Florida coast—a section that is alive with life during the winter when wealthy northerners flock there to escape the rigors of their home climate. St. Augustine, famous historically, is 39 miles south of Jacksonville and 98 miles further, which is a good day's run, are Ormond and Daytona beaches, well known resorts of pleasure seekers from the North.

Fla. Thirteen Days, 1591.2 Miles.

Chicago-Lafayette, 130.8 Miles.

	Miles to	Total Miles	
		Out	Return
Chicago	0.0	0.0	130.8
Garfield Blvd.	5.8	5.8	125.0
East Chicago	15.2	21.0	109.8
Highlands	6.1	27.1	103.7
Schererville	4.6	31.7	99.1
Crown Point	9.2	40.9	89.9
Thayer	17.7	58.6	72.2
Rensselaer	25.4	84.0	46.8
Remington	11.9	95.9	34.9
Wolcott	6.3	102.2	28.6
Montmorenci	20.0	122.2	8.6
Lafayette	8.6	130.8	0.0

Lafayette-Indianapolis, 66.1 Miles.

	Miles to	Total Miles	
		Out	Return
Lafayette	0.0	0.0	66.1
Frankfort	24.1	24.1	42.0

Antioch	3.5	27.6	38.5
Lebanon	12.8	40.4	25.7
Indianapolis	25.7	66.1	0.0
Indianapolis-Louisville, 124.2 Miles.			

	Miles to	Total Miles	Out Return
Indianapolis	0.0	0.0	124.2
Franklin	20.7	20.7	103.5
Taylorville	15.3	36.0	88.2
Columbus	7.3	43.3	80.9
Seymour	19.6	62.9	61.3
Crothersville	14.7	77.6	46.6
Scottsburg	11.1	88.7	35.5
Henryville	11.4	100.1	24.1
New Albany, Ind.	18.7	118.8	5.4

Hardyville	10.4	88.0	24.7
Bear Wallow	8.2	96.2	16.5
Cave City	6.1	102.3	10.4
Mammoth Cave	10.4	112.7	0.0
Mammoth Cave-Nashville, 112.6 Miles.			

	Miles to	Total Miles	Out Return
Mammoth Cave	0.0	0.0	112.6
Cave City	10.4	10.4	102.2
Good Night	7.9	18.3	94.3
Glasgow	7.7	26.0	86.6
Bruce	8.3	34.3	78.3
Lucas	3.0	37.3	75.3
Cedar Springs	8.0	45.3	67.3
Scottsville	6.9	52.2	60.4

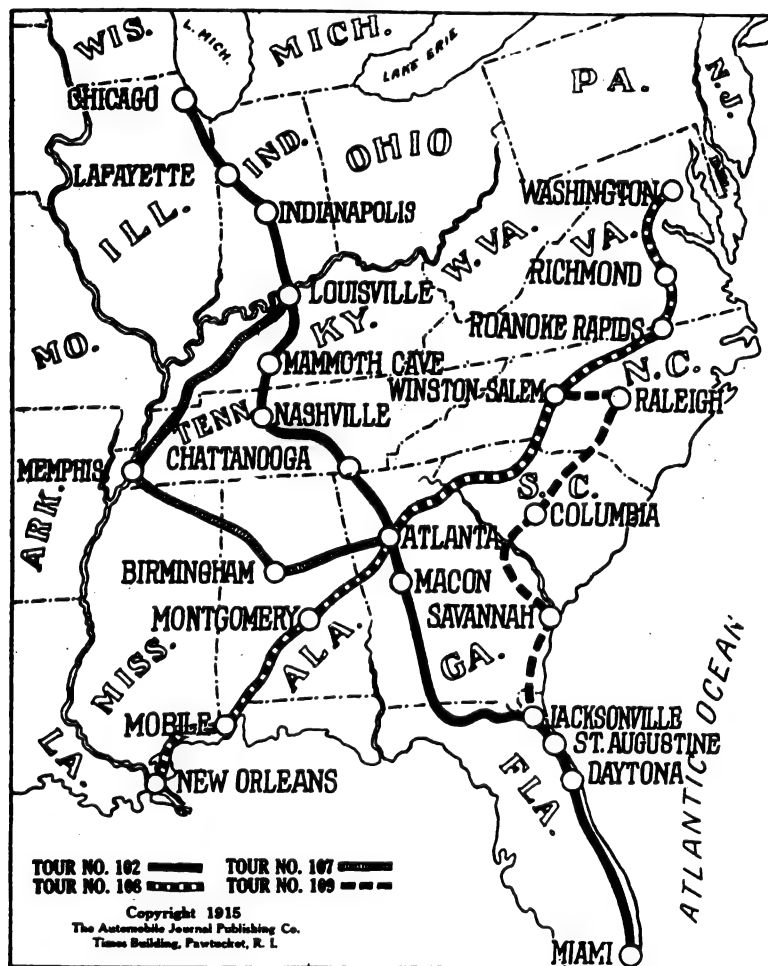
Beech Grove	17.2	49.0	91.1
Noah	4.8	53.8	86.3
Manchester	9.3	63.1	77.0
Hillsboro	8.3	71.4	68.7
Felham	9.0	80.4	59.7
Monteagle	6.9	87.3	52.8
Assembly College	0.7	88.0	52.1
Tracy City	5.9	93.9	46.2
Sequatchie	16.4	110.3	29.8
Jasper	3.9	114.2	25.9
Hooker	12.8	127.0	13.1
St. Elmo	10.3	137.3	2.5
Chattanooga	2.8	140.1	0.0
Chattanooga-Atlanta, 126.5 Miles.			

	Miles to	Total Miles	Out Return
Chattanooga	0.0	0.0	126.5
Ringgold	19.8	19.8	106.7
Chickamauga	1.5	21.3	105.2
Creek	1.9	23.2	103.3
Milledgeville	3.9	27.1	99.4
Tunnel Hill	7.1	34.2	92.3
Resaca	14.2	48.4	78.1
Calhoun	6.9	55.3	71.2
Adairsville	10.6	65.9	60.6
Cassville	10.2	76.1	50.4
Carterville	7.1	83.2	43.3
Emerson	3.8	87.0	39.5
Altoona	2.9	89.9	36.6
Acworth	4.2	94.1	32.4
Kennew	4.9	99.0	27.5
Marletta	6.5	105.5	21.0
Smyrna	6.1	111.6	14.9
Chattahoochee	2.7	114.3	12.2
Atlanta	12.2	126.5	0.0
Atlanta-Cordele, 158.9 Miles.			

	Miles to	Total Miles	Out Return
Atlanta	0.0	0.0	158.9
Hapeville	7.2	7.2	151.7
Jonesboro	10.5	17.7	141.2
Orma	3.5	21.2	137.7
Lovejoy	12.6	33.8	125.1
Hampton	5.2	39.0	119.9
Griffin	0.6	39.6	119.3
Orchard Hill	5.5	45.1	113.8
Milner	5.3	50.4	108.5
Barnsville	5.9	56.3	102.6
Forayth	13.2	69.5	89.4
Smarr's	5.2	74.7	84.2
Bollingbroke	6.5	81.2	77.7
Lorane	3.0	84.2	74.7
Macon	10.8	95.0	63.9
Echeconnee Sta- tion	11.9	106.9	52.0
Perry	16.3	123.2	35.7
Henderson	9.3	132.5	26.4
Vienna	17.8	150.3	8.6
Cordele	8.6	158.9	0.0
Cordele-Jacksonville, 236.5 Miles.			

Cordele-Jacksonville, 236.5 Miles.

	Miles to	Total Miles	Out Return
Cordele	0.0	0.0	236.5
Winona	5.2	5.2	231.2
Arabi	5.1	10.3	226.2
Sibley	3.3	13.6	222.9
Ashburn	7.4	21.0	215.5
Sycamore	2.6	23.6	212.9
Inaha	4.3	27.9	208.6
Tifton	14.0	41.9	194.6
Eldorado	7.0	48.9	187.6
Lenox	6.0	54.9	181.6
Sparks	7.7	62.6	173.9
Adel	2.4	65.0	171.5
Cecil	6.5	71.5	165.0
Hahira	4.9	76.4	160.1
Mincola Station	6.5	82.9	153.6
Valdosta	7.3	90.2	146.3
Madison	29.8	120.0	116.5
Lee's Station	8.0	128.0	108.5
Ellaville	7.7	135.7	100.8
Live Oak	13.4	149.1	87.4



Louisville	5.4	124.2	0.0
Louisville-Mammoth Cave, 112.7 Miles.			

	Miles to	Total Miles	Out Return
Louisville	0.0	0.0	112.7
Beuchel	7.4	7.4	105.3
Ashville	5.6	13.0	99.7
Mt. Washington	7.1	20.1	92.6
Smithville	3.0	23.1	89.6
High Grove	3.0	26.1	86.6
Cox Creek	6.8	32.9	79.8
Bardstown	6.3	39.2	73.5
New Haven	14.3	53.5	59.2
Athensville	1.8	55.3	57.4
Buffalo	11.9	67.2	45.5
Pike View	10.4	77.6	35.1

Adolphus, Ky.	9.5	61.7	50.9
Sugar Grove, Tenn.	1.7	63.4	49.2
Westmoreland	5.1	68.5	44.1
Bransford	4.5	73.0	39.6
Sideview	6.9	79.9	32.7
Gallatin	5.9	85.8	26.8
Avondale	7.9	93.7	18.9
Edenwold	8.3	102.0	10.6
Nashville	10.6	112.6	0.0

Nashville-Chattanooga, 140.1 Miles.

	Miles to	Total Miles	Out Return
Nashville	0.0	0.0	140.1
Laverne	15.7	15.7	124.4
Murfreesboro	16.1	31.8	108.3

Lake City	23.6	172.7	63.8
Watertown	2.6	175.3	61.2
Mount Carrie	5.6	180.9	55.6
Olustee	4.5	185.4	51.1
Sanderson	10.2	195.6	40.9
Glen St. Mary	8.3	203.9	32.6
MacClenny	2.4	206.3	30.2
Baldwin	10.2	216.5	20.0
Jacksonville	20.0	236.5	0.0

Jacksonville-Daytona, 98.1 Miles.

	Miles to	Total Miles	Out Return
Jacksonville	0.0	0.0	98.1
Loretta	12.5	12.5	85.6
Bayard	5.0	17.5	80.6
Durbia	5.1	22.6	75.5
St. Augustine	16.7	39.3	58.8
Moultrie	6.2	45.5	52.6
Hardyville	10.0	55.5	42.6
Bulow	23.7	79.2	18.9
Mount Zion	6.5	85.7	12.4
Ormond	5.5	91.2	6.9
Daytona	6.9	98.1	0.0

Daytona-Rockledge, 74.6 Miles.

	Miles to	Total Miles	Out Return
Daytona	0.0	0.0	74.6
New Smyrna	21.1	21.1	53.5
Oak Hill	11.8	32.9	41.7
Titusville	21.9	54.8	19.8
Coco	17.5	72.3	2.3
Rockledge	2.3	74.6	0.0

Rockledge-Fort Pierce, 70.5 Miles.

	Miles to	Total Miles	Out Return
Rockledge	0.0	0.0	70.5
Eau Gallie	15.6	15.6	54.9
Melbourne	5.2	20.8	49.7
Sebastian	21.5	42.3	28.2
Quay	7.7	50.0	20.5
Ft. Pierce	20.5	70.5	0.0

Fort Pierce-Miami, 139.6 Miles.

	Miles to	Total Miles	Out Return
Fort Pierce	0.0	0.0	139.6
Riviera	62.9	62.9	76.7
Palma Beach	4.9	67.8	71.8
Fort Lauderdale	44.0	111.8	27.8
Tilford	14.4	126.2	13.4
Miami	13.4	139.6	0.0

ITINERARY NO. 107.

Night Stops—Richmond, Va.; Henderson, Winston-Salem and Charlotte, N. C.; Greenville, S. C.; Atlanta, Ga.; Montgomery, Thomaston and Mobile, Ala.; Gulf Port, Miss.; New Orleans, La. Eleven Days, 1425.8 Miles.

Washington-Richmond, 121.6 Miles.

	Miles to	Total Miles	Out Return
Washington	0.0	0.0	121.6
Alexandria, Va.	7.2	7.2	114.4
Lorton	12.2	19.4	102.2
Ocoquan	3.5	22.9	98.7
Dumfries	19.7	33.6	88.0
Stafford	16.4	50.0	71.6
Fredericksburg	9.4	59.4	62.2
Massaponax	9.4	68.8	52.8
Castelman's Mill	5.9	74.7	46.9

Golansville	13.2	87.9	33.7
Ashland	16.4	104.3	17.3
Richmond	17.3	121.6	0.0

Richmond-Henderson, 145.9 Miles.

	Miles to	Total Miles	Out Return
Richmond	0.0	0.0	145.9
Petersburg	22.7	22.7	123.2
Carson	14.9	37.6	108.3
Loco	14.0	51.6	94.3
Jarrat	5.8	57.4	88.5
Emporia	9.9	67.3	78.6
Brink	7.7	75.0	70.9
Barley	6.9	81.9	64.0
Roanoke Rapids, N. C.	11.8	93.7	52.2
Holden	2.4	96.1	49.8
Thelma	6.7	102.8	43.1
King's Cross Roads	1.1	103.9	42.0
Sunlight	1.3	105.2	40.7
Littleton	5.3	110.5	35.4
Vaughan	5.8	116.3	29.6
Macon	5.4	121.7	24.2
Warrenton	5.7	127.4	18.5

Winston-Salem — Charlotte, 81.5 Miles.

	Miles to	Total Miles	Out Return
Winston-Salem	0.0	0.0	81.5
Midway	13.7	13.7	67.8
Brinkleys	3.2	16.9	64.6
Lexington	7.0	23.9	57.6
Spencer	14.6	38.5	43.0
Sallabury	2.8	41.3	40.2
China Grove	2.8	44.1	37.4
Landis	2.4	46.5	35.0
Kanapolis	4.7	51.2	30.3
Concord	7.9	59.1	22.4
Pharr's Mill	6.2	65.3	16.2
Newell	8.4	73.7	7.8
Charlotte	7.8	81.5	0.0

Charlotte-Greenville, 117.3 Miles.

	Miles to	Total Miles	Out Return
Charlotte	0.0	0.0	117.3
Sloane's Ferry	10.9	10.9	106.4
Belmont	1.7	12.6	104.7
Lowell	4.7	17.3	100.0



The National Capitol Building at Washington, D. C.

Afton	4.8	132.2	13.7
Henderson	13.7	145.9	0.0

Henderson — Winston-Salem, 148.5 Miles.

	Miles to	Total Miles	Out Return
Henderson	0.0	0.0	148.5
Oxford	11.7	11.7	136.8
Providence	5.7	17.4	131.1
Tallyho	5.2	22.6	125.9
Stem	1.3	23.9	124.6
Knapp of Reeds	4.7	28.6	119.9
Bragtown	11.6	40.2	108.3
Durham	3.3	43.5	105.0
Chapel Hill	12.1	55.6	92.9
White Cross	9.0	64.6	83.9
Saxapahaw	9.7	74.3	74.2
Graham	12.1	86.4	62.1
Burlington	2.9	89.3	59.2
Gibsonville	6.7	96.0	52.5
Whitsett Cross Roads	2.7	98.7	49.8
Greensboro	13.6	112.3	36.2
Guldford	5.7	118.0	30.5
Summersfield	6.7	124.7	23.8
Kernersville	11.7	136.4	12.1
Centerville	9.8	146.2	2.3
Winston-Salem	2.3	148.5	0.0

Gastonia	5.5	22.8	94.5
Bessemer City	6.8	29.6	87.7
King's Mountain	6.0	35.6	81.7
Grover	8.1	43.7	73.6
Blacksburg, S. C.	6.3	50.0	67.3
Gaffney	9.1	59.1	58.3
Cowpens	11.9	71.0	46.3
Converse	3.1	74.1	43.3
Spartanburg	6.4	80.5	36.9
Fair Forest	5.3	85.8	31.5
Tucapau	6.5	92.3	25.0
Duncan	4.6	96.9	20.4
Greer	5.1	102.0	15.3
Taylors	5.6	107.6	9.7
Greenville	9.7	117.3	0.0

Greenville-Atlanta, 170.7 Miles.

	Miles to	Total Miles	Out Return
Greenville	0.0	0.0	170.7
Oak Grove	9.4	9.4	161.3
Piedmont	2.2	11.6	159.1
Anderson	21.0	32.6	138.1
Fair Play	23.0	55.6	115.1
Lavonia, Ga.	10.2	65.8	104.9
Bowersville	5.6	71.4	99.3
Canon	2.4	73.8	96.9
Royston	4.5	78.3	92.4
Franklin Springs	2.3	80.6	90.1
Pocataligo	12.7	93.3	77.5



Rock Houses in North Carolina.

Commerce	12.5	105.7	65.0
Apple Valley	4.5	110.2	66.5
Jefferson	4.9	115.1	55.6
Winder	3.6	118.7	52.0
Carl	6.0	124.7	44.0
Lawrenceville	12.3	137.0	33.7
Snellville	7.4	144.4	24.3
Stone Mountain	10.4	154.8	15.9
Clarkson	5.0	159.8	10.9
Scottdale	2.1	161.9	8.8
Ingleside	1.1	163.0	7.7
Decatur	1.6	164.6	6.1
Kirkwood	1.9	166.5	4.3
Atlanta	4.2	170.7	0.0

Atlanta-Montgomery, 187.7
Miles.

	Miles to	Total Miles	Out Return
Atlanta	0.0	0.0	187.7
College Park	8.9	8.9	178.8
Red Oak	3.7	12.6	175.1
Fairburn	7.1	19.7	168.0
Palmetta	6.3	26.0	161.7
McCullom	5.4	31.4	156.3
Madras	2.9	34.3	153.4
Newman	6.7	41.0	146.7
Moreland	7.5	48.5	139.2
St. Charles	1.5	50.0	137.7
Grantville	4.4	54.4	133.3
La Grange	20.5	74.9	112.8
West Point	15.3	90.2	97.5
Langdale	4.9	95.1	92.6
Beulah	10.5	105.6	82.1
Opelika	14.4	120.0	67.7
Tuskegee	26.5	146.5	41.2
La Place	12.3	158.8	28.9
Shorter	5.1	163.9	23.8
Meigs	11.3	175.2	12.5
Montgomery	12.5	187.7	0.0

Montgomery-Thomasville,
127.2 Miles.

	Miles to	Total Miles	Out Return
Montgomery	0.0	0.0	127.2
Prattville	13.8	13.8	113.4
Autaugaville	11.7	25.5	101.7
Mulberry	8.7	34.2	93.0
Statesville	3.5	37.7	89.5
Burnsville	3.5	41.2	86.0
Selma	9.0	50.2	77.0
Beloit	12.1	62.3	64.9
Hazen	3.1	65.4	61.8
Orrville	3.9	69.3	57.9

Calvert	3.6	73.1	33.8
Mount Vernon	5.2	78.3	28.6
Chastang	3.5	81.8	25.1
Axis	8.4	90.2	16.7
Creola	2.1	92.3	14.6
Pennsylvania	1.2	93.5	13.4
Saraland	3.8	97.3	9.6
Plateau	6.4	103.7	3.2
Mobile	3.2	106.9	0.0

Mobile-Gulfport, 84 Miles.

	Miles to	Total Miles	Out Return
Mobile	0.0	0.0	84.0
Mertz, Ala.	4.0	4.0	80.0
Orange Grove, Miss.	30.0	34.0	50.0
Pascagoula	5.8	39.8	44.2
W. Pascagoula	1.9	41.7	42.3
Ocean Springs	10.6	52.3	31.7
Blloxl	18.7	71.0	13.0
Mississippi City	9.6	80.6	3.4
Gulf Port	3.4	84.0	0.0

Gulfport-New Orleans, 134.5
Miles.

	Miles to	Total Miles	Out Return
Gulf Port	0.0	0.0	134.5
Long Beach	3.1	3.1	131.4
Pass Christian	4.9	8.0	126.5
Cuevan	2.6	10.6	123.9
Vidalia	11.5	22.1	112.4
Standard	5.7	27.8	106.7
Poplarville	25.7	53.5	81.0
Bogalusa	35.2	88.7	45.8
Clalborne	28.1	116.8	17.7
Covington	0.6	117.4	17.1
Mandeville	10.0	127.4	7.1
New Orleans	7.1	134.5	0.0

ITINERARY NO. 108.

Night Stops—Atlanta, Ga.;
Birmingham and Tuscumbia,
Ala.; Memphis, Tenn.; Ful-
ton, Owensboro and Louis-
ville, Ky. Six Days, 881
Miles.



Point Rocks, French Broad River, North Carolina, One of the Most In-
teresting Monuments on the American Continent.

Atlanta-Birmingham, 187.3 Miles.

	Miles to	Total Miles	Out Return
Atlanta	0.0	0.0	187.3
Mableton	13.2	13.2	174.1
Austel	3.6	16.8	170.5
Lithia Springs	2.6	19.4	167.9
Douglasville	6.4	25.8	161.5
Winston	5.2	31.0	156.3
Villa Rica	5.7	36.7	150.6
Temple	8.7	45.4	141.9
Bremen	7.8	53.2	134.1
Waco	2.5	55.7	131.6
Tallapoosa	7.5	63.2	124.1
Heflin	23.5	86.7	100.6
Iron City	6.7	93.4	93.9
Choccolocco	2.4	95.8	91.5
De Armanville	3.8	99.6	87.7
Oxanna	7.0	106.6	80.7
Anniston	1.4	108.0	79.3
Alexander	9.1	117.1	70.2
Ohatchie	8.4	125.5	61.8
Greensport Ferry	6.7	132.2	55.1
Asheville	12.5	144.7	42.6
St. Clair Springs	10.6	155.3	32.0

Tusculumbia-Memphis, 159.5 Miles.

	Miles to	Total Miles	Out Return
Tusculumbia	0.0	0.0	159.5
Barton	11.7	11.7	147.8
Cherokee	4.7	16.4	143.1
Iuka, Miss.	18.3	34.7	124.8
Burnsville	9.6	44.3	115.2
Corinth	15.6	59.9	99.6
Esary Springs	20.5	80.4	79.1
Saulsbury	20.3	100.7	58.8
Grand Junction	6.9	107.6	51.9
La Grange	3.5	111.1	48.4
Moncow	9.7	120.8	38.7
Piperton	13.6	134.4	25.1
Collerville	1.5	135.9	23.6
Germantown	8.9	144.8	14.7
Whites	5.1	149.9	9.6
Memphis	9.6	159.5	0.0

Memphis-Fulton, 148 Miles.

	Miles to	Total Miles	Out Return
Memphis	0.0	0.0	148.0
Kerrville	22.0	22.0	126.0
Munford	6.0	28.0	120.0
Gilt Edge	9.1	37.1	110.9
Burlington	3.9	41.0	107.0

Owensboro-Louisville, 106 Miles.

	Miles to	Total Miles	Out Return
Owensboro	0.0	0.0	106.0
Rockport	10.0	10.0	96.0
Grand View	6.0	16.0	90.0
Troy	13.0	29.0	77.0
Don Juan	8.0	37.0	69.0
Leopold	8.0	45.0	61.0
Fredonia	16.0	61.0	45.0
Leavenworth	3.0	64.0	42.0
Wyandotte Cave	5.0	69.0	37.0
Corydon	11.0	80.0	26.0
Breckinridge	6.0	86.0	20.0
Laneville	2.0	88.0	18.0
Edwardsville	10.0	98.0	8.0
New Albany	5.0	103.0	3.0
Louisville	3.0	106.0	0.0

ITINERARY NO. 109.

Night Stops—Winston-Salem, Raleigh, N. C.; Cheraw and Columbia, S. C.; Waynes-



Andrews Geyser, Half Hidden Among the Mountains, on the Great Southern Railway's Route to Asheville, N. C.

Springfield	4.4	159.7	27.6
Birmingham	27.6	187.3	0.0

Birmingham-Tusculumbia, 138.2 Miles.

	Miles to	Total Miles	Out Return
Birmingham	0.0	0.0	138.2
Louisburg	5.5	5.5	132.7
Gardendale	4.5	10.0	128.2
Morris	6.7	16.7	121.5
Kimberly	4.3	21.0	117.2
Warrior	2.8	23.8	114.4
Blount Springs	9.7	33.5	104.7
Bangor	4.0	37.5	100.7
Hanceville	8.0	45.5	92.7
Cullman	10.2	55.7	82.5
Falkville	18.1	73.8	64.4
Hartsella	6.3	80.1	58.1
Flint Station	7.0	87.1	51.1
New Decatur	6.7	93.8	44.4
Decatur	1.4	95.2	43.0
Trinity	6.0	101.2	37.0
Hillaboro	6.0	107.2	31.0
Wheeler	4.0	111.2	27.0
Courtland	3.0	114.2	24.0
Town Creek	6.0	120.2	18.0
Leighton	7.0	127.2	11.0
Tusculumbia	11.0	138.2	0.0

Pill Jerk	8.0	49.0	99.0
Cherry	2.0	51.0	97.0
Gilmp	6.0	57.0	91.0
Ripley	9.3	66.3	81.7
Flippin	4.4	70.7	77.3
Dry Hill	2.3	73.0	75.0
Unionville	11.0	84.0	64.0
Beacham	26.0	110.0	38.0
Glass	5.2	115.2	32.8
Troy	8.8	124.0	24.0
Union City	9.0	133.0	15.0
Fulton	15.0	148.0	0.0

Fulton-Owensboro, 142 Miles.

	Miles to	Total Miles	Out Return
Fulton	0.0	0.0	142.0
Water Valley	6.0	6.0	136.0
Wings	10.0	16.0	126.0
Pryorsburg	4.0	20.0	122.0
Mayfield	6.0	26.0	116.0
Clark's River	10.0	36.0	106.0
Benton	12.0	48.0	94.0
Eddyville	12.0	60.0	82.0
Princeton	12.0	72.0	70.0
St. Charles	18.0	90.0	52.0
Madisonville	7.0	97.0	45.0
Calhoun	24.0	121.0	21.0
Glenville	6.0	127.0	15.0
Panther	5.0	132.0	10.0
Rome	4.0	136.0	6.0
Owensboro	6.0	142.0	0.0

boro, Savannah, Ga.; Jacksonville, Fla. Six Days, 764.7 Miles.

Winston-Salem-Raleigh, 123.5 Miles.

	Miles to	Total Miles	Out Return
Winston-Salem	0.0	0.0	123.4
Centerville	2.3	2.3	121.1
Kerneraville	9.8	12.1	111.3
Oak Ridge	6.1	18.2	105.2
Summersfield	5.6	23.8	99.6
Gulford Court-house	6.7	30.5	92.9
Greensboro	5.8	36.3	87.1
Gibsonville	16.4	52.7	70.7
Elmira Hill	5.6	58.3	65.1
Burlington	1.0	59.3	64.1
Graham	2.9	62.2	61.2
Saxaphaw	12.2	74.4	49.0
Chapel Hill	18.4	92.8	30.6
Durham	12.1	104.9	18.5
Morrisville	14.1	119.0	4.4
Raleigh	4.4	123.4	0.0

Raleigh-Cheraw, 138.5 Miles.

	Miles to	Total Miles	Out Return
Raleigh	0.0	0.0	138.5



A Glimpse of the Beautiful Foxtail Grass, Which Blooms on the Ranges in Central Texas.

Method	4.2	4.2	134.3
Cary	4.0	8.2	130.3
Apex	6.7	14.9	123.6
New Hill	6.3	21.2	117.3
Haywood	9.4	30.6	107.9
Moncure	1.0	31.8	106.9
Lockville	0.6	32.2	106.3
Sanford	13.7	45.9	92.6
Jonesboro	2.3	48.2	90.3
Lemon Springs	6.3	54.5	84.0
Cameron	6.2	60.7	77.8
Vass	6.1	66.8	71.7
Lakeview	2.1	68.9	69.6
Manley Station	5.1	74.0	64.5
Southern Pines	1.4	75.4	63.1
Pinehurst	5.8	81.2	57.3
Jackson Springs	11.5	92.7	45.8
Ellerbe Springs	12.3	105.0	33.5
Rockingham	11.5	116.5	22.0
Dockery's Mill	6.0	122.5	16.0
Crossland's Mill	5.7	128.2	10.3
Kollock Station	7.5	135.7	2.8
Cheraw, S. C.	2.8	138.5	0.0

Cheraw-Columbia, 117.5 Miles.

	Total Miles	Miles to	Out Return
Cheraw	0.0	0.0	117.5

Cash Station	6.0	6.0	111.5
Society Hill	8.0	14.0	103.5
Darlington	15.0	29.0	88.5
Hartsville	14.0	43.0	74.5
Lydia	6.7	49.7	67.8
Una	2.3	52.0	65.5
Aleot	3.0	55.0	62.5
Blahopville	4.7	59.7	57.8
Manville	5.8	65.5	52.0
McCutcheon	0.5	66.0	51.5
Camden	19.0	85.0	32.5
Lugoff Station	4.3	89.3	28.2
Blaney	8.9	98.2	19.3
Jacobs	4.3	102.5	15.0
Columbia	15.0	117.5	0.0

Columbia-Waynesboro, 106.6 Miles.

	Total Miles	Miles to	Out Return
Columbia	0.0	0.0	106.6
Brookland	1.5	1.5	105.1
Lexington	10.9	12.4	94.2
Leesville	16.9	29.3	77.3
Batesburg	2.1	31.4	75.2
Alken	27.1	58.5	48.1
Warrenville	6.2	64.7	41.9

Langley	3.1	67.8	38.8
Clearwater	3.3	71.1	35.5
Augusta	5.0	76.1	30.5
McBean	18.3	94.4	12.2
Waynesboro	12.2	106.6	0.0

Waynesboro-Savannah, 102.3 Miles.

	Total Miles	Miles to	Out Return
Waynesboro	0.0	0.0	102.3
Perkin	13.9	13.9	88.4
Millen	8.0	21.9	80.4
Scarboro	7.7	29.6	72.7
Rocky Ford	4.8	34.4	67.9
Statesboro	16.9	51.3	51.0
Blitchen	28.8	80.1	22.2
Savannah	22.2	102.3	0.0

Savannah-Jacksonville, 176.3 Miles.

	Total Miles	Miles to	Out Return
Savannah	0.0	0.0	176.3
Freedman's			
Grove	26.9	26.9	149.4
Midway Cemetery	3.0	29.9	146.4
Riceboro	4.7	34.6	141.7
Eulonia	17.2	51.8	124.5
Darlen-Dent's			
Ferry	11.5	63.3	113.0
Altamaha Mills	10.3	73.6	102.7
Brunswick	3.4	77.0	99.3
Old Sterling	10.6	87.6	88.7
Brookman, Ga.	10.4	98.0	78.3
Tarboro	19.7	117.7	58.6
Owen's Ferry	3.4	121.1	55.2
King's Ferry	14.3	135.4	40.9
Callahan	18.5	153.9	22.4
Jacksonville	22.4	176.3	0.0

Side Trip from Augusta.

Augusta to Atlanta, 183.6 Miles.

	Total Miles	Miles to	Out Return
Augusta	0.0	0.0	183.6
Belair	8.6	8.6	175.0
Bersella Station	8.7	17.3	166.3
Campania	2.8	20.1	163.5
Harlem	1.0	21.1	162.5
Thomson	13.8	34.9	148.7
Washington	28.8	63.7	119.9
Lexington	25.1	88.8	94.8
Crawford Sta.	3.6	92.4	91.2
Athens	14.1	106.5	77.1
Stratham	14.8	121.3	62.3
Winder	7.5	128.8	54.8
Lawrenceville	21.8	150.6	33.0
Clarkston	22.8	173.4	10.2
Atlanta	10.2	183.6	0.0



One of the Pretty Little Lakes in the Blue Ridge Mountains of North Carolina—Photo by Great Southern Railway.

TOURS THROUGH THE MIDDLE WEST.

Principal Cities Are Connected by Good Routes for Through Travel—Many Summer Resorts and Places of Interest.

TO VISITORS from other parts of the country the middle west does not offer the scenic or historic attractions of the East or the grandeur of the far West. There are, however, a tremendous number of motor cars throughout the section and some very excellent roads.

In addition the country is dotted with thousands of more or less developed summer resorts. Some of those along the great lakes are very large and well patronized by people from the South and all of the inland states that are far removed from the sea coast.

The tourist passing from East to West must cross the section, and will find a certain uniformity in the fertile rural districts, most of which are highly cultivated, but he will find, too, great and prosperous industrial and commercial cities, some fine woodland, large and navigable rivers, the greatest inland shipping in the world, and much else that will attract his interest.

Itinerary No. 155 is planned to connect Buffalo with Chicago and return by two equally interesting routes. Outbound it runs along the south shore of Lake Erie, through the city of Erie, Penn., Geneva-on-the-Lake, a well known summer resort, Ashtabula, Conneaut, Cleveland, Sandusky and Toledo.

At Sandusky is Cedar Point, one of the largest and best patronized watering places in the middle west, and from the city also steamers operate over the short run to Put-in-Bay Island, where Perry destroyed the English fleet in the war of 1812, and which is the site of a large summer colony with many hotels.

From Toledo the route goes through Goshen, South Bend and Valparaiso to Chicago.

Returning it runs through Michigan City, where there are very high sand dunes on the shore of Lake Michigan, to St. Joseph, in the heart of the fruit growing

district that borders the eastern shore of Lake Michigan. The Great Lakes have a moderating effect on extremes of both summer and winter weather, which makes their shores very suitable for growing fruit of all kinds. Grapes and peaches are produced in the largest quantities.

St. Joseph is connected with Chicago by daily excursion steamers and is a Gretna Green for runaway lovers from the Illinois me-

factories and its state normal school.

Detroit is the great centre of the automobile trade. It is an exceptionally beautiful town, laid out on the plan of Washington, with diagonal avenues. There are many fine parks on which Belle Isle, an island in the Detroit river, is the best known. It is one of the oldest cities in the West. The spot was visited first by La Salle in 1670 and in 1701 Sieur de La



New Pluto Spring at French Lick, Ind.

tropolis. West from St. Joseph the route strikes Battle Creek, which is famous for its sanatoriums and breakfast foods. It goes through Jackson, a manufacturing city, which is the seat of many motor car plants. Ann Arbor is chiefly famous as the location of the University of Michigan, the first of the great western state universities. It has more than 6000 students, who come from all parts of the world. Ypsilanti is known for its underwear

Mothe Cadillac came from Quebec with 100 soldiers and established a military post, known as Fort Pontchartrain. Bronze tablets mark the site of this post. Fort Wayne, on the river, is still garrisoned by United States troops. There are many fine drives and boulevards. Twelve great excursion steamers operate out of the city every day in the summer. The business of this sort, which centres at Detroit, is probably greater than that out of any other city

in the country, including New York and Chicago. The Detroit river carries more shipping than any other stream in the world. A ship passes on the average every minute during the summer months.

The Detroit river is crossed and the tourist finds himself at Windsor, Ont. Thence the route leads eastward through Leamington, London, Hamilton and Niagara Falls to Buffalo.

Itinerary No. 154 takes the tourist out of Cleveland toward the south. Cleveland is a city with a population of about three-quarters of a million, on the shore of Lake Erie. It is a large manufacturing city and is a great centre of the oil and steel business.



"Shades of Death" Near Indianapolis.

Much finished metal work of all sorts is produced here, including several makes of automobiles.

Akron is the first important town out of Cleveland. It is well known as the centre of the automobile tire trade. Its population has grown enormously with the increasing demand for automobile tires. Nearly 30,000 people are employed in that industry alone.

Canton was known as the home of William McKinley and his body lies there under an impressive monument. It is also on the Lincoln highway. Zanesville, further south, is a point on the National Old Trails road transcontinental highway. Columbus is a thriving inland manufacturing city and is the capital of Ohio. Among the state institutions located there are

the state university and the state prison.

Cincinnati is one of the oldest, and for a long time was the largest of Ohio cities. It owed its early greatness to the river traffic on the Ohio, and lost its pre-eminence when that traffic became in a measure replaced by railroad service.

Louisville has been described elsewhere. It is on the Dixie highway. French Lick springs is a great health resort. Thousands journey there to take the mud baths, which have valuable medical properties. Indianapolis is another city on the National Old Trails road and the Dixie highway has been elsewhere described.

Toledo, at the southwestern end

Detroit-Lima, 138.2 Miles.

	Miles to	Total Miles
	Out Return	
Detroit	0.0	0.0 138.2
Ecorse	8.9	8.9 129.3
Wyandotte	2.8	11.7 126.5
Trenton	4.3	16.0 122.2
Old Port	12.5	28.5 109.7
Monroe	9.2	37.7 100.5
La Salle	4.5	42.2 96.0
Erie	5.5	47.7 90.5
Toledo, O.	10.7	58.4 79.8
Maumee	9.0	67.4 70.8
Perrysburg	1.5	68.9 69.3
Bowling Green ..	12.6	81.5 56.7
Portage	3.3	84.8 53.4
Van Buren	12.7	97.5 40.7
Mortimer	2.0	99.5 38.7
Findlay	5.9	105.4 32.8
Mt. Cory	11.8	117.3 21.0
Bluffton	5.8	123.0 15.2
Beaver Dam	6.3	129.3 8.9
Lima	8.9	138.2 0.0

Lima-Cincinnati, 130.1 Miles.

	Miles to	Total Miles
	Out Return	
Lima	0.0	0.0 130.1
Snyder	5.4	5.4 124.7
Cridersville	2.3	7.7 122.4
Wapakoneta	7.9	15.6 114.5
Botkins	7.2	22.8 107.3
Anna	5.0	27.8 102.3
Sidney	7.7	35.5 94.6
Piqua	12.7	48.2 81.9
Troy	8.5	56.7 73.4
Eaglesburg	8.1	64.8 65.3
Vandalia	2.4	67.2 62.9
Chambersburg	2.3	69.5 60.6
Dayton	7.7	77.2 52.9
Centerville	9.3	86.5 43.6
Ridgeville	6.9	93.4 36.7
Lebanon	6.9	100.3 29.8
Hageman	4.5	104.8 25.3
Mason	3.8	108.6 21.5
Plagah	4.2	112.8 17.3
Sharon	4.0	116.8 13.3
Reading	3.7	120.5 9.6
Cincinnati	9.6	130.1 0.0

Cincinnati-Indianapolis, 124 Miles.

	Miles to	Total Miles
	Out Return	
Cincinnati	0.0	0.0 124.0
Cheviot	7.8	7.8 116.2
Dent	2.5	10.3 113.7
Miami	3.8	14.1 109.9
Harrison	7.9	22.0 102.0
New Trenton, Ind.	6.1	28.1 95.9
Cedar Grove	5.1	33.2 90.8
Brookville	6.6	39.8 84.2
Everton	11.6	51.4 72.6
Connersville	6.7	58.1 65.9
Milton	10.3	68.4 55.6
Cambridge City	2.3	70.6 53.4
Dublin	1.9	72.5 51.5
Strawn	4.6	77.1 46.9
Lewisville	3.3	80.4 43.6
Dunreith	4.5	84.9 39.1
Ogden	1.8	86.7 37.3
Raysville	2.3	89.0 35.0
Knightstown	0.8	89.8 34.2
Charlottesville	4.6	94.4 29.6
Cleveland	2.0	96.4 27.6
Greenfield	6.5	102.9 21.1
Cumberland	10.0	112.9 11.1
Indianapolis	11.1	124.0 0.0

Indianapolis-South Bend, 136 Miles.

	Miles to	Total Miles
	Out Return	
Indianapolis	0.0	0.0 136.0
Augusta	9.7	9.7 126.3
Roseton	11.3	21.0 115.0

ITINERARY NO. 152.

Night Stops—Detroit, Mich.; Lima and Cincinnati, O.; Indianapolis and South Bend, Ind. Five Days, 718.6 Miles.

Kirklin	10.4	31.4	104.6
Boyleston	6.8	38.2	97.8
Middlefork	8.6	46.8	89.2
Burlington	4.5	51.3	94.7
Darwin	2.6	53.9	82.1
Carroll	3.2	57.1	78.9
Logansport	13.0	70.1	65.9
Meta	8.7	78.8	57.3
Rochester	13.9	92.7	43.3
Argos	14.5	107.3	28.8
Plymouth	5.1	112.3	23.7
Lapas	8.2	120.5	18.5
Lakeville	4.9	125.4	10.6
South Bend	10.6	136.0	0.0

South Bend-Detroit, 190.3 Miles.

	Miles to	Total Miles	Out Return
South Bend	0.0	0.0	190.3

Detroit 6.0 190.3 0.0

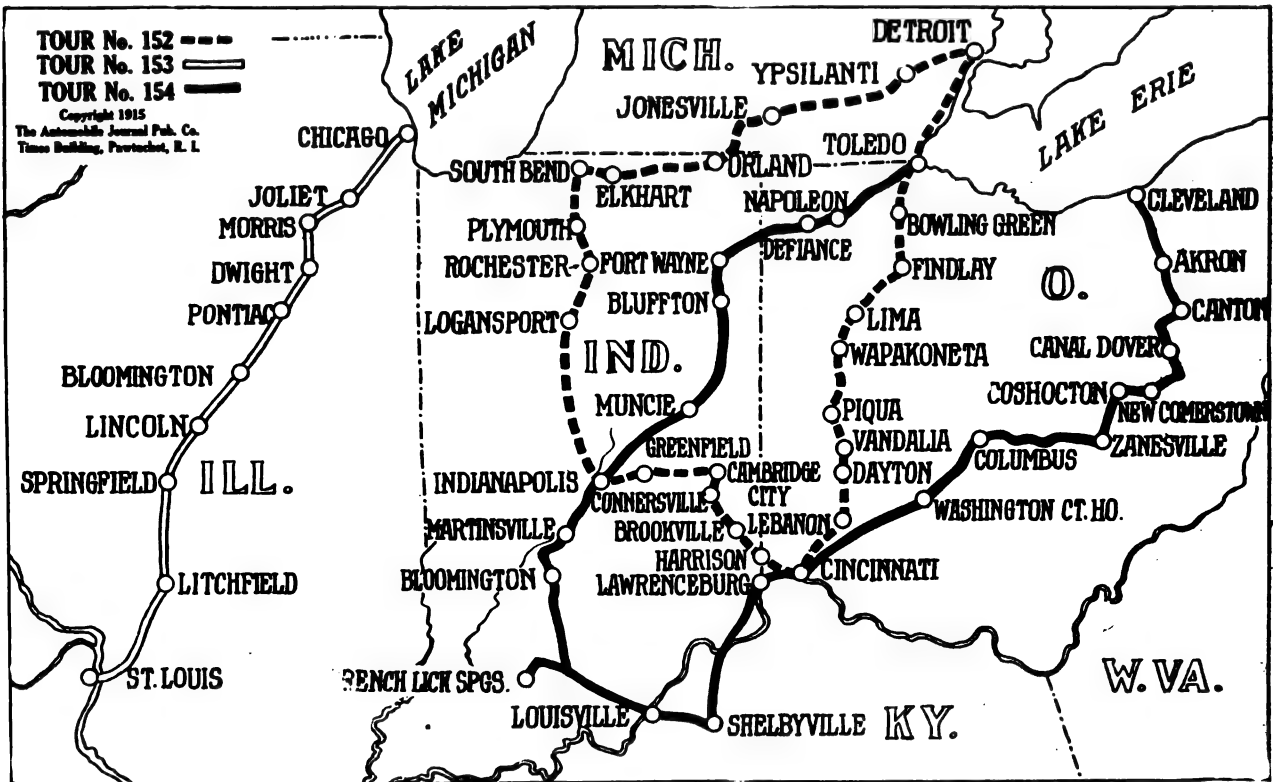
ITINERARY NO. 153.

Night Stops—St. Louis, Mo.; Springfield, Bloomington and Chicago, Ill. Three Days, 333.8 Miles.
St. Louis-Springfield, 107.8 Miles.

	Miles to	Total Miles	Out Return
St. Louis	0.0	0.0	107.8

Bloomington-Chicago, 149.5 Miles.

	Miles to	Total Miles	Out Return
Bloomington	0.0	0.0	149.5
Towanda	8.2	8.2	141.3
Lexington	10.1	18.3	131.2
Pontiac	22.9	41.2	108.3
Odell	10.8	52.0	97.5
Dwight	8.1	60.1	89.4
Morris	19.3	79.4	70.1
Minooka	13.3	92.7	56.8
Joliet	13.9	106.6	42.9
Lockport	4.0	110.6	38.9
LaGrange	19.5	130.1	19.4
Forest Park	9.5	139.6	9.9
Chicago	9.9	149.5	0.0



Mishawaka	4.0	4.0	186.3
Osceola	5.3	9.3	181.0
Elkhart	10.2	19.5	170.8
Middlebury	13.5	33.0	157.3
Shipshewana	6.3	39.3	151.0
Howe	12.6	51.9	138.4
Brenton	5.7	57.6	132.7
Orland	7.3	64.9	125.4
Kinderhook, Mich.	14.0	78.9	111.4
Cold Water	9.6	88.5	101.8
Quincy	6.2	94.7	95.6
Allen	5.9	100.6	89.7
Jonesville	5.6	106.2	84.1
Milne's Corners	4.1	110.3	80.0
Moscow	5.0	115.3	75.0
Somerset Center	4.9	120.2	70.1
Somerset	1.9	122.1	68.2
Cambridge Junction	8.0	130.1	60.2
Clinton	13.1	143.2	47.1
Saline	11.9	155.1	35.2
Ypsilanti	9.8	164.9	25.4
Wayne	12.2	177.1	13.2
Dearborn	7.2	184.3	6.0

E. St. Louis	2.1	2.1	105.7
Collinsville	10.8	12.9	94.9
Troy	3.0	15.9	91.9
Marysville	1.2	17.1	90.7
Edwardsville	8.3	25.4	82.4
Hamel	8.2	33.6	74.2
Staunton	11.0	44.6	63.2
Mt. Olive	6.4	51.0	56.8
Litchfield	10.9	61.9	45.9
Glenarm	31.6	93.5	14.3
Cotton Hill	6.2	99.7	8.1
Springfield	8.1	107.8	0.0

Springfield-Bloomington, 76.5 Miles.

	Miles to	Total Miles	Out Return
Springfield	0.0	0.0	76.5
Williamsville	15.0	15.0	61.5
Elkhart	8.0	23.0	53.5
Lincoln	14.5	37.5	39.0
McLean	20.9	58.4	18.1
Shirley	11.2	69.6	6.9
Bloomington	6.9	76.5	0.0

ITINERARY NO. 154.

Night Stops — Cleveland, Zanesville and Cincinnati, O.; Louisville, Ky.; Indianapolis and Fort Wayne, Ind.; Toledo, O. Six Days, 896.7 Miles.

Cleveland-Zanesville, 159.2 Miles.

	Miles to	Total Miles	Out Return
Cleveland	0.0	0.0	159.2
Independence	10.1	10.1	149.1
Brecksville	4.6	14.7	144.5
Ghent	11.3	26.0	133.2
Akron	8.7	34.7	124.5
Springville	5.3	40.0	119.2
Uniontown	5.3	45.3	113.9



A Disappearing Type of Covered Bridge in the Middle West.

Greentown	3.4	48.7	110.5
New Berlin	3.6	52.3	106.9
Canton	5.5	57.8	101.4
Navarre	10.6	65.4	90.8
Justus	2.9	71.3	87.9
Beach City	3.4	74.7	84.5
Canal Dover	11.0	85.7	73.5
New Philadelphia	3.2	88.9	70.3
Tuscarawas	7.5	96.4	62.8
Gnadenhuttchen	4.2	100.6	58.6
Port Washington	5.5	106.1	53.1
New Comerstown	6.5	112.6	46.6
Coshocton	14.8	127.4	31.8
Conesville	6.8	134.2	25.0
Dresden	8.9	143.1	16.1
Zanesville	16.1	159.2	0.0

Zanesville-Cincinnati, 176 Miles.

	Miles to	Total Miles	Out Return
Zanesville	0.0	0.0	176.0
Mt. Sterling	8.1	8.1	167.9
Gratiot	3.5	11.6	164.4
Linnville	7.0	18.6	157.4
Jacktown	4.0	22.6	153.4
Hebron	4.0	26.6	149.4
Etna	12.6	39.2	136.8
Reynoldsville	4.4	43.6	132.4
Columbus	12.1	55.7	120.3
Alton	9.4	65.1	110.9
West Jefferson	5.0	70.1	105.9
Lafayette	7.4	77.5	98.5
Summerford	4.7	82.2	93.8
Brighton	3.8	86.0	90.0
Harmony	7.2	93.2	82.8
Springfield	5.9	99.1	76.9
Harshman	20.3	119.4	56.6
Dayton	4.1	123.5	52.5
Centerville	9.4	132.9	43.1
Ridgville	6.9	139.8	36.2
Lebanon	6.9	146.7	29.3
Mason	7.8	154.5	21.5
Sharon	8.2	162.7	13.3
Reading	3.7	166.4	9.6
Cincinnati	9.6	176.0	0.0

Cincinnati-Louisville, 136.2 Miles.

	Miles to	Total Miles	Out Return
Cincinnati	0.0	0.0	136.2
Mack	9.4	9.4	126.8
Cleves	6.7	16.1	120.1
Homestead	7.3	23.4	112.8
Aurora	5.9	29.3	106.9
Rising Sun	8.3	37.6	98.6
Oberdeen	9.6	47.2	89.0
Vevay	14.2	61.4	74.8
Carrollton	8.6	70.0	66.2
New Castle	19.5	89.5	46.7
Eminence	4.5	94.0	42.2
Shelbyville	11.6	105.6	30.6
Simpsonville	7.6	113.2	23.0
Middletown	10.4	123.6	12.6
St. Mathews	6.3	129.9	6.3
Louisville	6.3	136.2	0.0

Louisville-Indianapolis (via French Lick), 179.7 Miles.

	Miles to	Total Miles	Out Return
Louisville	0.0	0.0	179.7
New Albany	6.2	6.2	173.5
Palmyra	18.4	24.6	155.1
Fredricksburg	4.8	29.4	150.3
Paoli	17.9	47.3	132.4
West Baden	10.2	57.5	122.2
French Lick	1.2	58.7	121.0
Prospect Corners	2.0	60.7	119.0
Paoli	9.1	69.8	109.9
Orleans	7.7	77.5	102.2
Mitchell	5.2	82.7	97.0
Bedford	10.4	93.1	86.6
Needmore	5.8	98.9	80.8
Harrodsburg	6.4	105.3	74.4
Bloomington	11.0	116.3	63.4
Ellettsville	7.4	123.7	56.0
Gosport	9.5	133.2	46.5
Martinsville	15.9	149.1	30.6
Waverly	13.7	162.8	16.9
Indianapolis	16.9	179.7	0.0

Indianapolis-Fort Wayne, 137.1 Miles.

	Miles to	Total Miles	Out Return
Indianapolis	0.0	0.0	137.1
Cumberland	11.1	11.1	126.0
Greenfield	9.6	20.7	116.4
Pendleton	15.2	35.9	101.2
Anderson	8.4	44.3	92.8
Muncie	22.0	66.3	70.8
Fairview	14.4	80.7	56.4
Pennville	15.4	96.1	41.0
Petroleum	8.3	104.4	32.7
Bluffton	8.9	113.3	23.8
Fort Wayne	23.8	137.1	0.0

Fort Wayne-Toledo, 108.5 Miles.

	Miles to	Total Miles	Out Return
Fort Wayne	0.0	0.0	108.5
Maysville	15.2	15.2	93.3
Hicksville	10.5	25.7	82.8
Defiance	21.2	46.9	61.6
Napoleon	18.5	65.4	43.1
Liberty Center	8.6	74.0	34.5
White House	15.3	89.3	19.2
Monclova	5.7	95.0	13.5
Maumee	4.3	99.3	9.2
Toledo	9.2	108.5	0.0

ITINERARY NO. 155.

Night Stops—Buffalo, N. Y.; Ashtabula and Toledo, O.; South Bend, Ind.; Chicago, Ill.; St. Joseph, Battle Creek and Detroit, Mich.; London, Ont. Nine Days, 1189 Miles.

Buffalo-Ashtabula, 134.6 Miles.

	Miles to	Total Miles	Out Return
Buffalo	0.0	0.0	134.6
Evans	21.2	21.2	113.4
Irving	7.6	28.8	105.8
Silver Creek	3.4	32.2	102.4
Sheridan	5.9	38.1	96.5
Fredonia	6.0	44.1	90.5
Brocton	6.8	50.9	83.7
Portland	1.4	52.3	82.3
Westfield	6.9	59.2	75.4
Forsythe	5.3	64.5	70.1
Ripley	3.8	68.3	66.3
State Line	3.0	71.3	63.3
Northeast, Penn.	4.4	75.7	58.9
Harbor Creek	7.2	82.9	51.7
Wesleyville	3.8	86.7	47.9
Erie	3.3	90.0	44.6
Fairview	12.4	102.4	32.2
Girard	3.8	106.2	28.4
East Springfield	5.5	111.7	22.9
West Springfield	3.8	115.5	19.1
Conneaut, O.	4.6	120.1	14.5
Amboy	3.4	123.5	11.1
Kingsville	4.6	128.1	6.5
Ashtabula	6.5	134.6	0.0

Ashtabula-Toledo, 178.3 Miles.

	Miles to	Total Miles	Out Return
Ashtabula	0.0	0.0	178.3
Saybrook	5.6	5.6	172.7
Geneva	4.2	9.8	168.5
Unionville	4.3	14.1	164.2
Madison	2.5	16.6	161.7
Painesville	11.1	27.7	150.6
Mentor	5.8	33.5	144.8
Willoughby	4.9	38.4	139.9
Wickliffe	5.8	44.2	134.1
Euclid	2.8	47.0	131.3
Cleveland	10.3	57.3	121.0
Rocky River	8.0	65.3	113.0
Finney's Corners	1.8	67.1	111.2



The St. Joe River in Indiana.

Dover	4.4	71.5	106.8
Bement	3.4	74.9	103.4
Ridgeville	3.7	78.6	99.7
Elyria	4.7	83.3	95.0
Amherst	7.4	90.7	87.6
Henrietta	3.3	94.0	84.3
Birmingham	2.7	96.7	81.6
Berlinville	8.8	105.5	72.8
Norwalk	7.0	112.5	65.8
Monroeville	4.8	117.3	61.0
N. Monroeville	3.8	121.1	57.2
Bellevue	6.0	127.1	51.3
Clyde	7.6	134.7	43.6
Sandusky Jet	6.9	141.6	38.7
Fremont	0.7	142.3	36.0
Woodville	14.6	156.9	21.4
Lemoyne	6.5	163.4	14.9
Stony Bridge	2.0	165.4	12.9
Toledo	12.9	178.3	0.0

Toledo-South Bend, 166 Miles.

	Miles to	Total Miles	Out Return
Toledo	0.0	0.0	166.0
Java	17.0	17.0	149.0
Swanton	6.5	23.5	142.5
Delta	6.8	30.3	135.7
Wauseon	8.6	38.9	127.1
Archbold	10.3	49.2	116.8
Stryker	7.1	56.3	109.7
Bryan	8.1	64.4	101.6
Edgerton	11.6	76.0	90.0

South Chicago	5.3	86.0	15.1
Bryn Mawr	3.0	89.0	12.1
Chicago	12.1	101.1	0.0

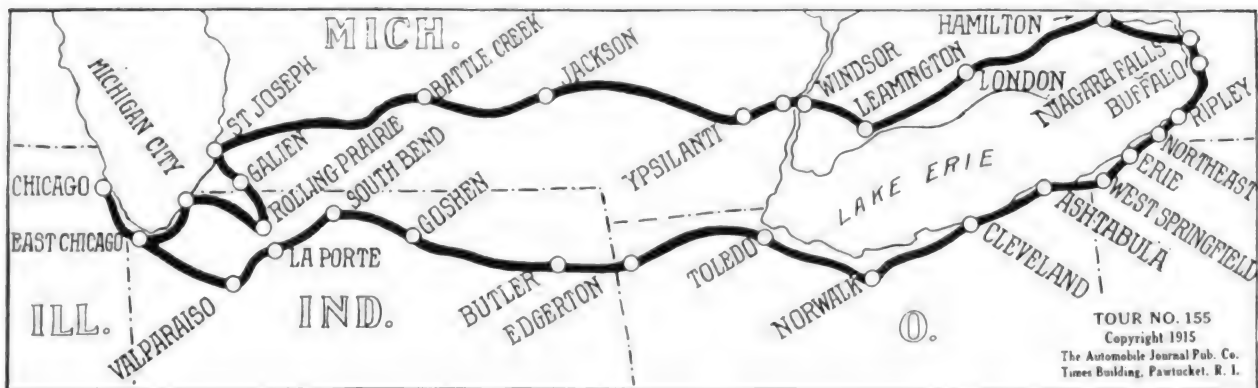
Chicago-St. Joseph, 122.8 Miles.

	Miles to	Total Miles	Out Return
Chicago	0.0	0.0	122.8
Washington Park	6.2	6.2	116.6
Burnside	5.2	11.4	111.4
Roseland	3.1	14.5	108.3
Kensington	0.7	15.2	107.6
Riverdale	2.6	17.8	105.0
Dolton	0.7	18.5	104.3
Oak Glen	6.3	24.8	98.0
Lansing	1.4	26.2	96.6
Munster	0.7	26.9	95.9
Highlands, Ind.	3.1	30.0	92.8
Gary	7.4	37.4	85.4
Hobart	4.0	41.4	81.4
Porter	13.1	54.5	68.3
Michigan City	16.3	70.7	52.1
Rolling Prairie	14.8	85.5	37.3
Hudson Lake	5.0	90.5	32.3
Gallen, Mich.	7.8	98.3	24.5
Glendora	5.9	104.2	18.6
Hill's Corners	6.0	110.2	12.6
Baroda	1.0	111.2	11.6
Stevensville	4.4	115.6	7.2

Chelsea	11.3	64.0	52.5
Lima Center	8.6	72.6	43.9
Ann Arbor	10.1	82.7	33.8
Ypsilanti	8.4	91.1	25.4
Wayne	12.2	103.3	13.2
Dearborn	7.2	110.5	6.0
Detroit	6.0	116.5	0.0

Detroit-London, 142 Miles.

	Miles to	Total Miles	Out Return
Detroit	0.0	0.0	142.0
Windsor, Ont.	0.4	0.4	141.6
Old Castle	8.9	9.3	132.7
Maldstone	3.5	12.8	129.2
Essex	4.5	17.3	124.7
Olinda	5.3	22.6	119.4
Ruthven	7.8	30.4	111.6
Leamington	3.6	34.0	108.0
Wheatley	7.8	41.8	100.2
Cedar Springs	26.7	68.5	73.5
Blenheim	4.1	72.6	69.4
Ridgetown	9.9	82.5	59.5
Highgate	6.4	88.9	53.1
Clachan	7.7	96.6	45.4
Wardville	7.5	104.1	37.9
Wood Green	3.1	107.2	34.8
Strathburna	3.0	110.2	31.8
Melbourne	9.3	119.5	22.5
Delaware	9.4	128.9	13.1
Lambeth	6.6	135.5	6.5



TOUR NO. 155
Copyright 1915
The Automobile Journal Pub. Co.
Times Building, Pawtucket, R. I.

Butler, Ind.	7.0	83.0	83.0
Waterloo	7.7	90.7	75.3
Kendallville	13.5	104.2	61.8
Brimfield	7.0	111.2	54.8
Wawaka	4.5	115.7	50.3
Ligonier	6.2	121.9	44.1
Millersburg	9.2	131.1	34.9
Goshen	9.4	140.5	25.5
Elkhart	10.2	150.7	15.3
Osceola	6.0	156.7	9.3
Mishawaka	5.3	162.0	4.0
South Bend	4.0	166.0	0.0

South Bend-Chicago, 101.1 Miles.

	Miles to	Total Miles	Out Return
South Bend	0.0	0.0	101.1
New Carlisle	13.6	13.6	87.5
La Porte	12.3	25.9	75.2
Pinhook	8.4	34.3	66.8
Westville	2.7	37.0	64.1
Valparaiso	10.3	47.3	53.8
Wheeler	7.5	54.8	46.3
Hobart	5.2	60.0	41.1
Gary	4.0	64.0	37.1
Highlands	7.4	71.4	29.7
Heaville	2.2	73.6	27.5
Gibson	1.1	74.7	26.4
Grasselli	1.0	75.7	25.4
Calumet	0.9	76.6	24.5
East Chicago	1.1	77.7	23.4
Whitting	3.0	80.7	20.4

St. Joseph	7.2	122.8	0.0
------------	-----	-------	-----

St. Joseph-Battle Creek, 75 Miles.

	Miles to	Total Miles	Out Return
St. Joseph	0.0	0.0	75.0
Benton Harbor	1.4	1.4	73.6
Riverside	6.1	7.5	67.5
Coloma	4.3	11.7	63.3
Watervliet	2.3	14.0	61.0
Hartford	4.8	18.8	56.2
Lawrence	5.8	24.6	50.4
Paw Paw	8.8	33.4	41.6
Almena	5.6	39.0	36.0
Kalamazoo	12.6	51.6	23.4
Galesburg	8.6	60.2	14.8
Gull Lake Junction	5.3	65.5	9.5
Battle Creek	9.5	75.0	0.0

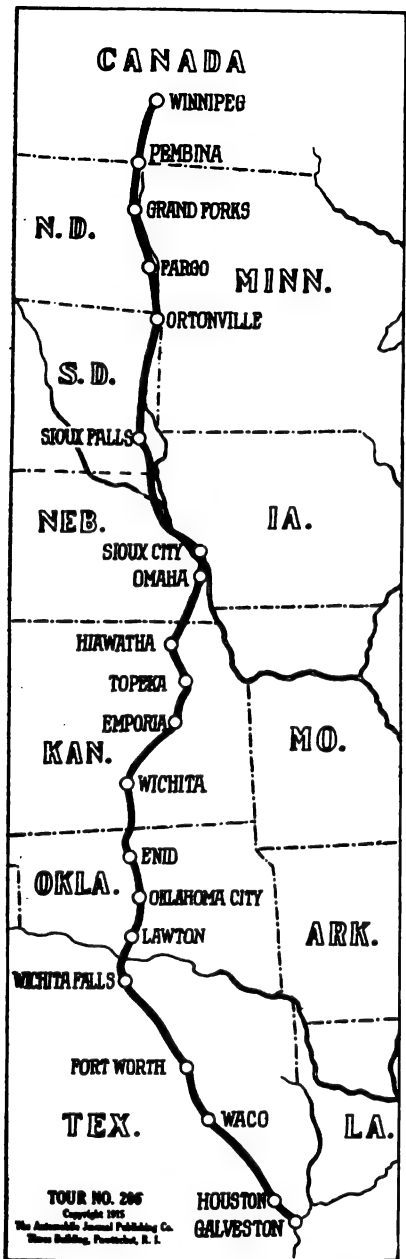
Battle Creek-Detroit, 116.5 Miles.

	Miles to	Total Miles	Out Return
Battle Creek	0.0	0.0	116.5
Cresco	8.0	8.0	108.5
Marshall	5.1	13.1	103.4
Albion	11.3	24.4	92.1
Parma	7.9	32.3	84.2
Jackson	10.3	42.6	73.9
Grass Lake	10.1	52.7	63.8

London	6.5	142.0	0.0
--------	-----	-------	-----

London-Buffalo, 152.7 Miles.

	Miles to	Total Miles	Out Return
London	0.0	0.0	152.7
Crumlin	5.8	5.8	146.9
Thamesford	8.3	14.1	138.6
Ingersoll	6.3	20.4	132.3
Beachville	4.7	25.1	127.6
Woodstock	4.7	29.8	122.9
Oxford	4.5	34.3	118.4
Cathcart	8.1	42.4	110.3
Brantford	13.9	56.3	96.4
Gainsville	3.3	59.6	93.1
Ancaster	13.2	72.8	79.9
Hamilton	6.8	79.6	73.1
Stony Creek	6.7	86.3	66.4
Winona	5.6	91.9	60.8
Grimsby	5.1	97.0	55.7
Beamsville	4.9	101.9	50.8
Vineland	4.2	106.1	46.6
Jordan	1.8	107.9	44.8
St. Catharines	7.1	115.0	37.7
Homer	3.3	118.3	34.4
St. Davids	4.9	123.2	29.5
Stamford	2.1	125.3	27.4
Niagara Falls			
Ont.	4.8	130.1	22.6
N. Y.	1.0	131.1	21.6



Echota Station...	2.5	133.6	19.1
La Salle	3.0	136.6	16.1
Gratwick	4.5	141.1	11.6
N. Tonawanda	1.7	142.8	9.9
Tonawanda	0.4	143.2	9.5
Buffalo	9.5	152.7	0.0

ITINERARY NO. 206.

Winnipeg-Galveston.

Night Stops—Winnipeg, Man.; Pembina, Grand Forks and Fargo, N. D.; Ortonville, Minn.; Brookings, S. D.; Sioux City, Ia.; Omaha,

Neb.; Hiawatha, Topeka, Emporia and Wichita, Kan.; Enid, Oklahoma City and Lawton, Okla.; Wichita Falls, Fort Worth, Waco, Bryan, Houston and Galveston, Tex. Twenty Days, 2023.9 Miles.

Winnipeg-Pembina, 73 Miles.

	Miles to	Total Miles	
	Out	Return	
Winnipeg	0.0	0.0	73.0
St. Norbert	9.9	9.9	63.1
St. Nazaire	13.6	23.5	49.5
Morris	18.0	41.5	31.5
St. Jean Baptiste	6.2	47.7	25.3
Letellier	8.8	56.5	16.5
Emerson	12.5	69.0	4.0
Pembina, N. D.	4.0	73.0	0.0

Pembina-Grand Forks, 85.5 Miles.

	Miles to	Total Miles	
	Out	Return	
Pembina	0.0	0.0	85.5
Hamilton	17.6	17.6	67.9
Glasston	6.9	24.5	61.0
St. Thomas	6.3	30.8	54.7
Auburn	7.0	37.8	47.7
Grafton	6.8	44.6	40.9
Minto	10.4	55.0	30.5
Ardock	6.7	61.7	23.8
Manvel	12.3	74.0	11.5
Grand Forks	11.5	85.5	0.0

Grand Forks-Fargo, 95.5 Miles.

	Miles to	Total Miles	
	Out	Return	
Grand Forks	0.0	0.0	95.5
Merrifield	8.9	8.9	86.6
Thompson	4.7	13.6	81.9
Reynolds	7.2	20.8	74.7
Buxton	5.5	26.3	69.2
Taft	11.4	37.7	57.8
Hillsboro	3.5	41.2	54.3
Mapleton	40.8	82.0	13.5
Fargo	13.5	95.5	0.0

Fargo-Ortonville, 124 Miles.

	Miles to	Total Miles	
	Out	Return	
Fargo	0.0	0.0	124.0
Saunders	4.5	4.5	119.5
Wild Rice	4.0	8.5	115.5
Hickson	7.2	15.7	108.3
Christine	5.8	21.5	102.5
Abercrombie	11.5	33.0	91.0
Dwight	10.0	43.0	81.0
Wahpeton	8.5	51.5	72.5
Tyler	8.0	59.5	64.5
Fairmont	6.5	66.0	58.0
Blackmer	6.2	72.2	51.8
White Rock, Minn.	4.5	76.7	47.3
Wheaton	10.5	87.2	36.8
Dumont	7.3	94.5	29.5
Collis	3.5	98.0	26.0
Graceville	6.5	104.5	19.5
Clinton	7.0	111.5	12.5
Ortonville	12.5	124.0	0.0

Ortonville-Brookings, 89 Miles.

	Miles to	Total Miles	
	Out	Return	
Ortonville	0.0	0.0	89.0
Big Stone City, S. D.	1.0	1.0	88.0
Mill Bank	13.5	14.5	74.5
La Bolt	13.5	28.0	61.0
Altamont	14.5	42.5	46.5
Clear Lake	7.0	49.5	39.5
Toronto	14.0	63.5	25.5
Brookings	25.5	89.0	0.0

Brookings-Sioux City, 145.3 Miles.

	Miles to	Total Miles	
	Out	Return	
Brookings	0.0	0.0	145.3
Dell Rapids	38.0	38.0	107.3
Sioux Falls	20.0	58.0	87.3
Worthing	16.5	74.5	70.8
Beresford	17.5	92.0	53.3
Elk Point	32.8	124.8	20.5
Jefferson	15.5	140.3	5.0
Sioux City, Ia.	5.0	145.3	0.0

Sioux City-Omaha, 109.1 Miles.

	Miles to	Total Miles	
	Out	Return	
Sioux City	0.0	0.0	109.1
Salix	16.5	16.5	92.6
Sloan	7.5	24.0	85.1
Whitney	10.7	34.7	74.4
Omaha	8.0	42.7	66.4
River Sioux	16.3	59.0	50.1
Missouri Valley	22.5	81.5	27.6
Loveland	4.5	86.0	23.1
Honey Creek	4.5	90.5	18.6
Crescent	6.2	96.7	12.4
Council Bluffs	8.0	104.7	4.4
Omaha, Neb.	4.4	109.1	0.0

Omaha-Hiawatha, 123 Miles.

	Miles to	Total Miles	
	Out	Return	
Omaha	0.0	0.0	123.0
South Omaha	4.2	4.2	118.8
Albright	3.0	7.2	115.8
Fort Crook	3.0	10.2	112.8
La Platte	4.0	14.2	108.8
Plattsmouth	6.2	20.4	102.6
Mynard	3.5	23.9	99.1
Murray	4.0	27.9	95.1
Wyoming	13.0	40.9	82.1
Nebraska City	7.2	48.1	74.9
Julian	10.5	58.6	64.4
Auburn	10.0	68.6	54.4
Howe	6.2	74.8	48.2
Stella	8.5	83.3	39.7
Verdon	9.5	92.8	30.2
Falls City	11.5	104.3	18.7
Hiawatha, Kan.	18.7	123.0	0.0

Hiawatha-Topeka, 70.5 Miles.

	Miles to	Total Miles	
	Out	Return	
Hiawatha	0.0	0.0	70.5
Horton	14.0	14.0	56.5
Whiting	9.5	23.5	47.0
Holton	15.0	38.5	32.0
Mayetta	9.3	47.8	22.7
Hoyt	7.0	54.8	15.7
Topeka	15.7	70.5	0.0

Topeka-Emporia, 75.5 Miles.

	Miles to	Total Miles	
	Out	Return	
Topeka	0.0	0.0	75.5
Wakarusa	12.5	12.5	63.0
Seranton	10.5	23.0	52.5
Burlingame	6.8	29.8	45.7
Osage City	10.2	40.0	35.5
Lebo	15.5	55.5	20.0
Emporia	20.0	75.5	0.0

Emporia-Wichita, 108.5 Miles.

	Miles to	Total Miles	
	Out	Return	
Emporia	0.0	0.0	108.5
Plymouth	8.5	8.5	100.0
Saffordville	3.5	12.0	96.5
Ellinor	2.0	14.0	94.5
Cottonwood Falls	7.8	21.8	86.7
Elmdale	6.2	28.0	80.5
Clements	7.7	35.7	72.8
Cedar Point	6.5	42.2	66.3
Florence	6.7	48.9	59.6
Peabody	14.8	63.7	44.8
Walton	11.6	75.3	33.2
Newton	8.2	83.5	25.0
Wichita	25.0	108.5	0.0

Wichita-Enid, 117 Miles.

	Miles to	Total Miles	Out Return
Wichita	0.0	0.0	117.0
Wellington	31.2	31.2	85.8
South Haven	15.0	46.2	70.8
Druey	5.3	51.5	65.5
Caldwell	6.5	58.0	59.0
Renfrow, Okla.	10.0	68.0	49.0
Medford	12.5	80.5	36.5
Pond Creek	12.5	93.0	24.0
Kremalin	10.0	103.0	14.0
Enid	14.0	117.0	0.0

Enid-Oklahoma City, 96.5 Miles.

	Miles to	Total Miles	Out Return
Enid	0.0	0.0	96.5
Waukomis	8.0	8.0	88.5
Bison	6.5	14.5	82.0
Hennessy	7.0	21.5	75.0
Dover	11.0	32.5	64.0
Kingfisher	11.8	44.3	52.2
El Reno	25.2	69.5	27.0
Oklahoma City	27.0	96.5	0.0

Wichita Falls-Fort Worth, 125.5 Miles.

	Miles to	Total Miles	Out Return
Wichita Falls	0.0	0.0	125.5
Henrietta	25.0	25.0	100.5
Bellevue	15.5	40.5	85.0
Bowie	16.0	56.5	69.0
Fruitland	8.0	64.5	61.0
Sunset	11.0	75.5	50.0
Decatur	12.0	87.5	38.0
Rhome	10.5	98.0	27.5
Saginaw	16.0	114.0	11.5
Fort Worth	11.5	125.5	0.0

Fort Worth-Waco, 135 Miles.

	Miles to	Total Miles	Out Return
Fort Worth	0.0	0.0	135.0
Crowley	20.0	20.0	115.0
Cleburne	18.0	38.0	97.0
George's Creek	14.0	52.0	83.0
Nemo	5.5	57.5	77.5

Bryan-Houston, 105.5 Miles.

	Miles to	Total Miles	Out Return
Bryan	0.0	0.0	105.5
Myers	7.5	7.5	98.0
Wellborn	7.0	14.5	91.0
Millican	6.0	20.5	85.0
Nevasota	10.0	30.5	75.0
Courtney	8.0	38.5	67.0
Howth	5.0	43.5	62.0
Hemstead	4.5	48.0	57.5
Prairie View	5.5	53.5	52.0
Waller	6.0	59.5	46.0
Hockley	10.0	69.5	36.0
Cypress	11.5	81.0	24.5
Latsuma	7.5	88.5	17.0
Fairbanks	5.0	93.5	12.0
Houston	12.0	105.5	0.0

Houston-Galveston, 58.5 Miles.

	Miles to	Total Miles	Out Return
Houston	0.0	0.0	58.5
South Houston	8.5	8.5	50.0
Seabrook	6.0	14.5	44.0
League City	11.0	25.5	33.0
Dickinson	8.5	34.0	24.5



Irrigation Farming on the Prairies of the Great Northwest: The Buford-Trenton Project, Looking East from Buford, N. D.—Photo by Great Northern Railway.

Oklahoma City-Lawton, 141.5 Miles.

	Miles to	Total Miles	Out Return
Oklahoma City	0.0	0.0	141.5
El Reno	27.0	27.0	114.5
Pocasset	37.0	64.0	77.5
Chickasha	11.0	75.0	66.5
Anadarko	21.0	96.0	45.5
Apache	18.7	114.7	26.8
Rohrer	13.0	127.7	13.8
Lawton	13.8	141.5	0.0

Lawton-Wichita Falls, 60.5 Miles.

	Miles to	Total Miles	Out Return
Lawton	0.0	0.0	60.5
Geronimo	10.0	10.0	50.5
Emerson	9.0	19.0	41.5
Randlett	15.0	34.0	26.5
Burkburnett, Tex.	11.5	45.5	15.0
Wichita Falls	15.0	60.5	0.0

Rainbow	4.5	62.0	73.0
Glenrose	4.0	66.0	69.0
Walnut Springs	12.0	78.0	57.0
Meridian	9.0	87.0	48.0
Clifton	13.0	100.0	35.0
Valley Mills	10.0	110.0	25.0
China Springs	12.0	122.0	13.0
Waco	13.0	135.0	0.0

Waco-Bryan, 85.5 Miles.

	Miles to	Total Miles	Out Return
Waco	0.0	0.0	85.5
Battle	12.0	12.0	73.5
Reese	5.5	17.5	68.0
Perry	5.5	23.0	62.5
Marlin	8.0	31.0	54.5
Regan	7.0	38.0	47.5
Bremond	9.0	47.0	38.5
Calvert	12.0	59.0	26.5
Carne	8.0	67.0	18.5
Sutton	5.0	72.0	13.5
Bentley	6.0	78.0	7.5
Bryan	7.5	85.5	0.0

Texas City	9.5	43.5	15.0
Galveston	15.0	58.5	0.0

ITINERARY NO. 207.**Denver to Phoenix.**

Night Stops—Denver, Colorado Springs, Pueblo and Trinidad, Col.; Las Vegas, Santa Fe, Albuquerque and McCarty, N. M.; Springerville, Globe and Phoenix, Ariz. Ten Days, 942 Miles.

Denver-Colorado Springs, 69.2 Miles.

	Miles to	Total Miles	Out Return
Denver	0.0	0.0	69.2



Typical Scene in the Oil Field District of Texas and Oklahoma.

Littleton	9.0	9.0	60.2
Ascequia	7.0	16.0	53.2
Gann	3.5	19.5	49.7
Sedalia	3.8	23.3	45.9
Ferry Park	14.0	37.3	31.9
Palmer Lake	9.2	46.5	22.7
Monument Lake	3.0	49.5	19.7
Fring	3.5	53.0	16.2
Custard	2.5	55.5	13.7
Breed	5.7	61.3	8.0
Pike View	3.5	64.7	4.5
Colorado Springs	4.5	69.2	0.0

Colorado Springs-Pueblo, 42.5 Miles.

	Miles to	Total Miles	Out Return
Colorado Springs	0.0	0.0	42.5
Kelker	4.5	4.5	38.0
Fountain	8.5	13.0	29.5
Buttes	7.3	20.3	22.2
Pislon	10.5	30.8	11.7
Bragdon	3.5	34.3	8.2
Eden	2.0	36.3	6.2
Pueblo	6.2	42.5	0.0

Pueblo-Trinidad, 90 Miles.

	Miles to	Total Miles	Out Return
Pueblo	0.0	0.0	90.0
Walsenburg	50.5	50.5	39.5
Pryor	10.0	60.5	29.5
Acular	9.3	69.8	20.3
Chicosa	10.2	80.0	10.0
Bowen	4.5	84.5	5.5
Trinidad	5.5	90.0	0.0

Trinidad-Las Vegas, 141 Miles.

	Miles to	Total Miles	Out Return
Trinidad	0.0	0.0	141.0
Starkville	4.0	4.0	137.0
Gallinas	5.0	9.0	132.0
Morley	2.3	11.3	129.7
Raton, N. M.	14.0	25.3	115.7
Dorney	17.2	42.5	98.5
Maxwell	11.5	54.0	87.0
French	5.0	59.0	82.0
Springer	10.7	69.7	71.3
Rayado	5.8	75.5	65.5
Colmor	4.8	80.3	60.7
Nolan	4.0	84.3	56.7
Wagon Mound	13.3	97.6	43.4
Watrous	23.0	120.6	20.4
Onara	9.7	130.3	10.7
Arriba	8.5	138.8	2.2
Las Vegas	2.2	141.0	0.0

Las Vegas-Santa Fe, 75.3 Miles.

	Miles to	Total Miles	Out Return
Las Vegas	0.0	0.0	75.3

Tecolote	12.0	12.0	63.3
Bernal	6.3	18.3	57.0
Fulton	15.3	33.6	41.7
Pajarita	7.0	40.6	34.7
Rowe	2.3	42.9	32.4
Pecos	6.7	49.6	25.7
Glorieta	6.0	55.6	19.7
Canoncito	4.5	60.1	15.2
Santa Fe	15.2	75.3	0.0

Santa Fe-Albuquerque, 66.7 Miles.

	Miles to	Total Miles	Out Return
Santa Fe	0.0	0.0	66.7
Agua Fria	5.0	5.0	61.7
La Bajada	10.2	21.2	45.5
Domingo	5.7	26.9	39.8
Algodones	14.3	41.2	25.5
Old Bernalillo	5.3	46.5	20.2
Bernalillo	2.3	48.8	17.9
Sandia	3.7	52.5	14.2
Alameda	6.2	58.7	8.0
Albuquerque	8.0	66.7	0.0

Albuquerque-McCarty, 82.3 Miles.

	Miles to	Total Miles	Out Return
Albuquerque	0.0	0.0	82.3
Atlatco	3.3	3.3	79.0
Laguna	45.0	48.3	34.0
Casa Blanca	6.7	55.0	27.3
Enchanted Mesa	10.7	65.7	16.6
McCarty	16.6	82.3	0.0

McCarty-Springerville, 112 Miles.

	Miles to	Total Miles	Out Return
McCarty	0.0	0.0	112.0
Nation's Ranch	75.5	75.5	36.5
Laguna Salina	12.5	88.0	24.0
Springerville, Ariz.	24.0	112.0	0.0

Springerville-Globe, 148 Miles.

	Miles to	Total Miles	Out Return
Springerville	0.0	0.0	148.0
Cooley's Ranch	42.0	42.0	106.0
White Mountain Reservation	19.0	61.0	87.0
Forage	42.0	103.0	45.0
Rice	22.5	125.5	22.5
Globe	22.5	148.0	0.0

Globe-Phoenix, 115 Miles.

	Miles to	Total Miles	Out Return
Globe	0.0	0.0	115.0
Livingston	23.5	23.5	91.5
Roosevelt	11.3	34.8	80.2
Goldfield	43.2	78.0	37.0
Mesa	21.0	99.0	16.0
Frankenburg	5.3	104.3	10.7
Tempe	1.2	105.5	9.5
Phoenix	9.5	115.0	0.0

ITINERARY NO. 208.

Night Stops—Salt Lake City, Utah; Malad City, Pocatello, Hailey, Boise and Weiser, Idaho; La Grande, Ore.; Walla Walla, North Yakima, Cle Elum and Seattle, Wash. Ten Days, 1001 Miles.

Salt Lake City-Malad City, 111.5 Miles.

	Miles to	Total Miles	Out Return
Salt Lake City	0.0	0.0	111.5
Bountiful	9.1	9.1	102.4
Centerville	2.2	11.3	100.2
Farmington	7.7	19.0	92.5
Kayville	2.1	21.1	90.4
Layton	2.5	23.6	87.9
Clearfield	4.7	28.3	83.2



Marker on Hill Top Near Colorado Springs.

Ogden	9.1	37.4	74.1
North Ogden ..	8.9	46.3	65.2
Willard	5.0	51.3	60.2
Bingham	9.4	60.7	50.8
Honeyville	9.3	70.0	41.5
Deweyville	4.3	74.3	37.2
Collinston	4.7	79.0	32.5
Fielding	4.0	83.0	28.5
Plymouth	6.0	89.0	22.5
Portage	7.5	96.5	15.0
Cherry Creek, Idaho	8.7	105.2	6.3
Malad City	6.3	111.5	0.0

Malad City-Pocatello, 62.5 Miles.

	Miles to	Total Miles	Out Return
Malad City	0.0	0.0	62.5
Arimo	29.0	29.0	33.5
McCammon	6.5	35.5	27.0
Onyx	7.0	42.5	20.0
Nikun	5.5	48.0	14.5
Port Neuf	5.5	53.5	9.0
Pocatello	9.0	62.5	0.0

Pocatello-Hailey, 140 Miles.

	Miles to	Total Miles	Out Return
Pocatello	0.0	0.0	140.0
Ross Fork	12.0	12.0	128.0
Gibson	6.0	18.0	122.0
Blackfoot	7.0	25.0	115.0
Taber	20.0	45.0	95.0
Cerro Grande ..	15.0	60.0	80.0
Powell	10.0	70.0	70.0
Arco	15.0	85.0	55.0
Martin	17.0	102.0	38.0
Muldoon	18.0	120.0	20.0
Hailey	20.0	140.0	0.0

Hailey-Boise, 112 Miles.

	Miles to	Total Miles	Out Return
Hailey	0.0	0.0	112.0
Blaine	16.0	16.0	96.0
Seiby	7.0	23.0	89.0
Soldier	4.5	27.5	84.5
Corral	7.5	35.0	77.0
Little Camas ..	25.0	60.0	52.0
Thurman	24.0	84.0	28.0
Mayfield	10.0	94.0	18.0
Barber	12.0	106.0	6.0
Boise	6.0	112.0	0.0

Boise-Weiser, 83 Miles.

	Miles to	Total Miles	Out Return
Boise	0.0	0.0	83.0
Beatty	6.0	6.0	77.0
Sonna	8.0	14.0	69.0
Caldwell	12.0	26.0	57.0
Loraine	6.0	32.0	51.0
Jenness	5.0	37.0	46.0
Hanna	9.0	46.0	37.0
New Plymouth ..	12.0	58.0	25.0
Payette	9.0	67.0	16.0
Rebecca	11.0	78.0	5.0
Weiser	5.0	83.0	0.0

Weiser-La Grande, 106 Miles.

	Miles to	Total Miles	Out Return
Weiser	0.0	0.0	106.0
Feton	7.0	7.0	99.0
Blakes	8.0	15.0	91.0
Huntington, Ore.	3.0	18.0	88.0
Lime	4.0	22.0	84.0
Weatherby	6.0	28.0	78.0
Durkee	7.0	35.0	71.0
Pleasant Valley ..	12.0	47.0	59.0
Norton	8.0	55.0	51.0
Baker City	5.0	60.0	46.0
Haines	12.0	72.0	34.0
Hutchinson	5.0	77.0	29.0
North Powden ..	5.0	82.0	24.0
Tolocaset	6.0	88.0	18.0
Union	7.0	95.0	11.0

La Grande-Walla Walla, 68 Miles.

	Miles to	Total Miles	Out Return
La Grande	0.0	0.0	68.0
Allice	6.0	6.0	62.0
Elgin	13.0	19.0	49.0
Berkley	23.0	42.0	26.0
Blue Mountain ..	10.0	52.0	16.0
Milton	5.0	57.0	11.0
Spofford	3.0	60.0	8.0
State Line	3.0	63.0	5.0
Walla Walla, Wash.	5.0	68.0	0.0

Walla Walla-North Yakima, 132 Miles.

	Miles to	Total Miles	Out Return
Walla Walla	0.0	0.0	132.0
Sudbury	7.0	7.0	125.0

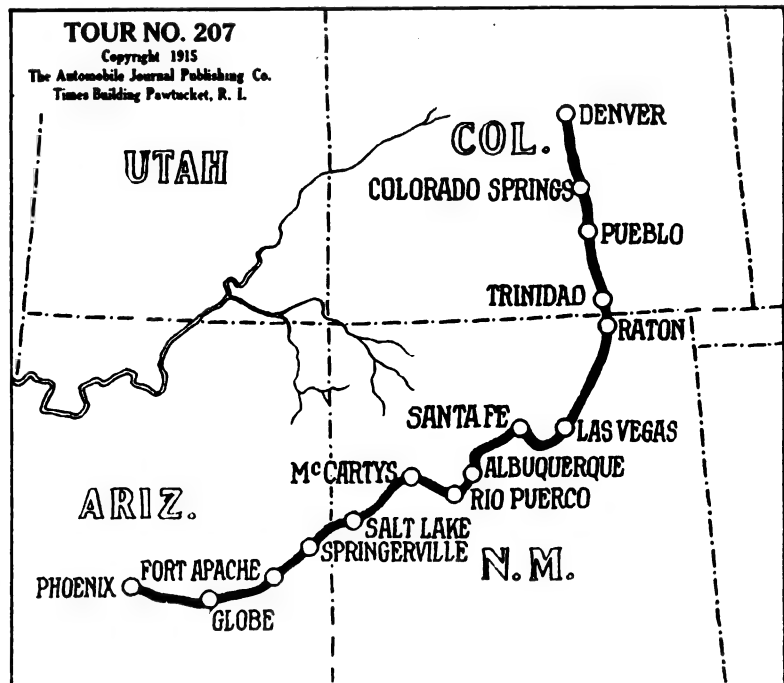
Horlick	7.0	60.0	12.0
Teasaway	5.0	65.0	7.0
South Cle Elum ..	4.0	69.0	3.0
Cle Elum	3.0	72.0	0.0

Cle Elum-Seattle, 114 Miles.

	Miles to	Total Miles	Out Return
Cle Elum	0.0	0.0	114.0
Nelson	16.0	16.0	98.0
Easton	7.0	23.0	91.0
Laconia	20.0	43.0	71.0
Edgewick	18.0	61.0	53.0
Northbend	5.0	66.0	48.0
Fall City	13.0	79.0	35.0
Isaquah	11.0	90.0	24.0
Black River	13.0	103.0	11.0
South Park	6.0	109.0	5.0
Seattle	5.0	114.0	0.0

ITINERARY NO. 209.

Night Stops—Vancouver, B.



Divide	13.0	20.0	112.0
Wallula	9.0	29.0	103.0
Hover	4.0	33.0	99.0
Finley	4.0	37.0	95.0
Kennewick	8.0	45.0	87.0
Klona	18.0	63.0	69.0
Prosser	15.0	78.0	54.0
Grandview	13.0	91.0	41.0
Sunnyside	6.0	97.0	35.0
Zillah	14.0	111.0	21.0
Buena	4.0	115.0	17.0
Donald	5.0	120.0	12.0
Yakima	7.0	127.0	5.0
North Yakima ..	5.0	132.0	0.0

North Yakima-Cle Elum, 72 Miles.

	Miles to	Total Miles	Out Return
North Yakima ..	0.0	0.0	72.0
Pomona	9.0	9.0	63.0
Wenas	18.0	27.0	45.0
Ellensburg	14.0	41.0	31.0
Thorp	12.0	53.0	19.0

C.; Seattle and Chehalis, Wash.; Portland, Salem, Cottage Grove, Riddle and Medford, Ore.; Sisson, Redding, Chico and Sacramento, Cal. Eleven Days, 1076.2 Miles.

Vancouver-Seattle, 138 Miles.

	Miles to	Total Miles	Out Return
Vancouver	0.0	0.0	138.0
New Westminster ..	8.0	8.0	130.0
Brownsville	3.0	11.0	127.0
Blaine, Wash.	15.0	26.0	112.0
Custer	8.0	34.0	104.0
Barrdale	5.0	39.0	99.0
Bellingham	10.0	49.0	89.0
Bow	13.0	62.0	76.0
Mt. Vernon	10.0	72.0	66.0



A Road Across Washington.

Conway	6.0	78.0	60.0
English	20.0	98.0	40.0
Shohomish	15.0	113.0	25.0
Kenmore	15.0	128.0	10.0
Seattle	10.0	138.0	0.0

Seattle-Chehalis, 131 Miles.

	Miles to	Total Miles	Out Return
Seattle	0.0	0.0	131.0
Christopher	32.0	32.0	99.0
Tacoma	8.0	40.0	91.0
South Tacoma	11.0	51.0	80.0
Rainier	24.0	75.0	56.0
Olympia	21.0	96.0	35.0
Temino	15.0	111.0	20.0
Centralia	18.0	127.0	4.0
Chehalis	4.0	131.0	0.0

Chehalis-Portland, 100.5 Miles.

	Miles to	Total Miles	Out Return
Chehalis	0.0	0.0	100.5
Cowlitz	18.2	18.2	82.3
Toledo	1.9	20.1	80.4
Castle Rock	18.0	38.1	64.4
Lexington	8.9	45.0	55.5
Kelso	1.5	46.5	54.0
Carrollton	7.0	53.5	47.0
Kalama	5.5	59.0	41.5
Woodlawn Ferry	10.1	69.1	31.4
La Centre	5.6	74.7	25.8
Vancouver	18.4	93.1	7.4
Portland, Ore.	7.4	100.5	0.0

Portland-Salem, 94 Miles.

	Miles to	Total Miles	Out Return
Portland	0.0	0.0	94.0
Oregon City	19.0	19.0	75.0
Salem	75.0	94.0	0.0

Salem-Cottage Grove, 99 Miles.

	Miles to	Total Miles	Out Return
Salem	0.0	0.0	99.0
Jefferson	18.8	18.8	80.2
Albany	9.2	28.0	71.0
Hamsburg	30.8	58.8	40.2
Junction City	4.7	63.5	35.5
Eugene	18.5	77.0	22.0
Goshen	6.0	83.0	15.1
Cottage Grove	15.1	99.0	0.0

Cottage Grove-Riddle, 80.2 Miles.

	Miles to	Total Miles	Out Return
Cottage Grove	0.0	0.0	80.2
Krewnon	15.2	15.2	65.0
Yoncalles	18.8	34.0	46.2
Oakland	3.8	37.8	42.4

Southern	3.4	41.2	39.0
Roseburg	13.9	55.1	25.1
Dole	13.0	68.1	12.1
Myrtle Creek	5.1	73.2	7.0
Riddle	7.0	80.2	0.0

Riddle-Medford, 84 Miles.

	Miles to	Total Miles	Out Return
Riddle	0.0	0.0	84.0

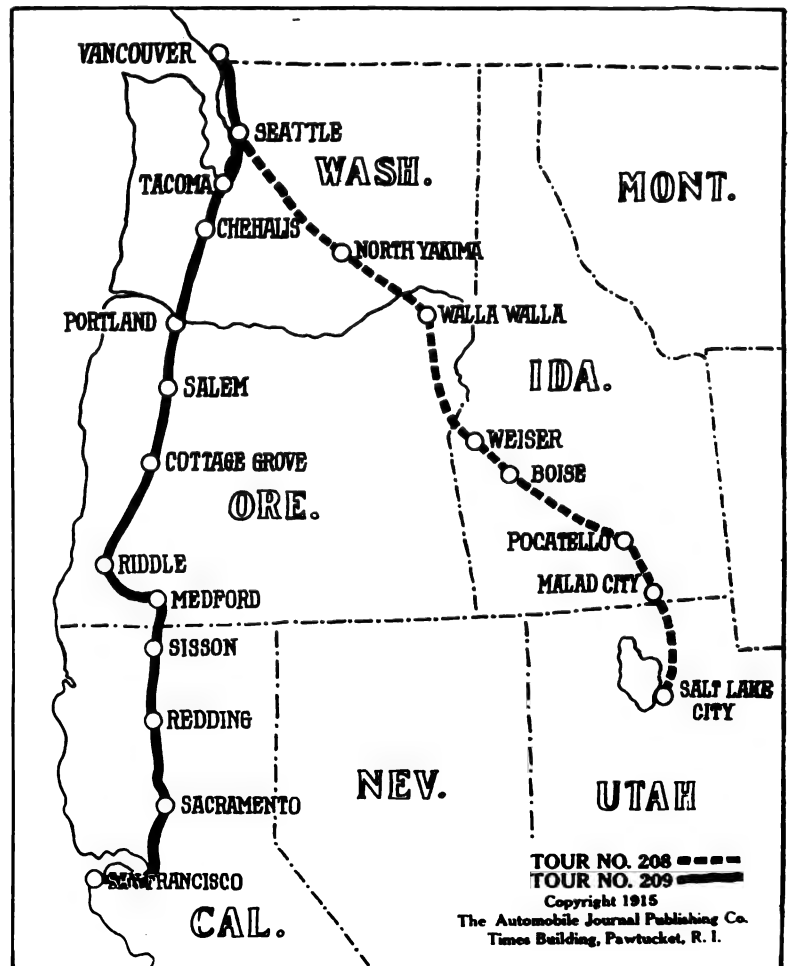
Wolf Creek	28.3	28.3	55.7
Grant's Pass	20.2	48.5	35.5
Gold Hill	19.3	67.8	16.2
Tole	4.7	72.5	11.5
Central Point	5.2	77.7	6.3
Medford	6.3	84.0	0.0

Medford-Sisson, 75.1 Miles.

	Miles to	Total Miles	Out Return
Medford	0.0	0.0	75.1
Ashland	2.8	2.8	72.3
Rawhide Toll	1.8	4.6	70.5
Gate, Cal.	2.0	6.6	68.5
Siskiyou Pass	6.0	12.6	62.5
Hornbrook	11.9	24.5	50.6
Montague	15.1	39.6	35.5
Edgewood	21.5	61.1	14.0
Weed	4.1	65.2	9.9
Sisson	9.9	75.1	0.0

Sisson-Redding, 83.9 Miles.

	Miles to	Total Miles	Out Return
Sisson	0.0	0.0	83.9
Shasta Springs	8.6	8.6	75.3
Dunsmuir	3.3	11.9	72.0
Castle Brook	6.0	17.9	66.0
Castella	1.3	19.2	64.7
Southern	6.7	25.9	58.0
Kennett	43.0	68.9	15.0
Buckeye	10.1	79.0	4.9
Redding	4.9	83.9	0.0





Emerald Bay, an Arm of the Beautiful Lake Tahoe, California, One of America's Finest Lakes.

Redding-Chico, 76.5 Miles.

	Miles to	Total Miles Out Return
Redding	0.0	0.0 76.5
Anderson	11.8	11.8 64.7
Cottonwood	5.7	17.5 59.0
Red Bluff	16.4	33.9 42.6
Proberta	7.4	41.3 35.2
Vina	15.1	56.4 20.1
Chico	20.1	76.5 0.0

Chico-Sacramento, 114 Miles.

	Miles to	Total Miles Out Return
Chico	0.0	0.0 114.0
Live Oaks	37.7	37.7 76.3
Marysville	12.8	50.5 63.5
Wheatland	16.9	67.4 46.6
Sheridan	4.4	71.8 42.2
Lincoln	10.6	82.4 31.6
Roseville	10.2	92.6 21.4
Ben All	16.2	108.8 5.2
Sacramento	5.2	114.0 0.0

MAKE TOURING NOTES ON THIS PAGE

Date..... Place.....

Memo:

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

Date..... Place.....

Memo

Memo

Memo

DIGEST OF THE MOTORING LAWS NOW IN

State	Act of	Amended	Registration	With Whom	Address	Fees	Driver
Alabama	1911	....	Annual	Secretary of State	Montgomery	*\$7.50-\$20	....
Arizona	1913	....	Annual	Secretary of State	Phoenix	*\$5-\$15	....
Arkansas	1911	1913	Annual	Com. Highways	Little Rock	\$10	....
California	1913	1915	Annual	Mot. Veh. Dpt.	Sacramento	*40c H. P.	\$1.00
Colorado	1913	....	Annual	Secretary of State	Denver	*\$2.50-\$10	....
Connecticut	1913	1915	Annual	Secretary of State	Hartford	50c H. P.	\$2.00
Delaware	1915	....	Annual	Secretary of State	Dover	\$5	*\$5.00
Florida	1911	....	Perpetual	Secretary of State	Tallahassee	\$2	....
Georgia	1910	....	Perpetual	Secretary of State	Atlanta	\$2	....
Idaho	1913	1915	Annual	County Assessors	County Seat	\$15-40	....
Illinois	1911	....	Annual	Secretary of State	Springfield	*\$4-\$10	....
Indiana	1913	....	Annual	Secretary of State	Indianapolis	*\$5-\$20	....
Iowa	1913	1915	Annual	Secretary of State	Des Moines	*\$8 up	....
Kansas	1913	....	Annual	Secretary of State	Topeka	\$5	....
Kentucky	1914	....	Annual	Com. Mot. Veh.	Frankfort	*\$6-\$20	\$2.00
Louisiana	1914	....	Annual	Com. Mot. Veh.	Baton Rouge	25c H. P.	....
Maine	1911	1913	Annual	Secretary of State	Augusta	*\$5-\$15	....
Maryland	1910	1914	Annual	Com. Mot. Veh.	Baltimore	*\$5-\$25	\$2.00
Massachusetts	1909	1912	Annual	Highway Com.	Boston	*\$6-\$25	\$2.00
Michigan	1914	....	Annual	Secretary of State	Lansing	\$3	....
Minnesota	1911	1915	Triennial	Secretary of State	St. Paul	\$1.50	\$1.50
Mississippi	....	....	Annual	State Auditor	Jackson	\$2	....
Missouri	1911	1913	Perpetual	Secretary of State	Jefferson City	*\$2-\$12	....
Montana	1913	....	Annual	Secretary of State	Helena	\$2	....
Nebraska	1911	1915	Annual	Secretary of State	Lincoln	\$3	....
Nevada	1913	....	Annual	Secretary of State	Carson City	12.5c H. P.	....
New Hampshire	1911	1915	Annual	Com. Mot. Veh.	Concord	*\$10-\$40	\$3.00
New Jersey	1906	1915	Annual	Com. Mot. Veh.	Trenton	*\$4.50-\$15	\$2-\$4
New Mexico	1913	....	Annual	Secretary of State	Santa Fe	*\$2-12	\$1.00
New York	1910	1915	Annual	Secretary of State	Albany	*\$5-\$25	....
North Carolina	1913	....	Annual	Secretary of State	Raleigh	*\$5-\$10	....
North Dakota	1911	....	Annual	Secretary of State	Bismarck	\$3	....
Ohio	1906	1914	Annual	Secretary of State	Columbus	\$3-\$5	....
Oklahoma	1913	1915	Annual	Highway Com.	Oklahoma City	50c H. P.	....
Oregon	1915	....	Annual	Secretary of State	Salem	\$3-\$10	\$2.00
Pennsylvania	1910	1911	Annual	Highway Dept.	Harrisburg	*\$5-\$15	\$2.00
Rhode Island	1908	1912	....	Bd. Pub. Roads	Providence	*\$5-\$20	....
South Carolina	1906	....	Annual	Clerk Cty. Ct.	County Seat	\$1	....
South Dakota	1915	....	Annual	Secretary of State	Pierre	\$3	....
Tennessee	1915	....	Perpetual	Secretary of State	Nashville	\$5-\$7.50	....
Texas	....	....	Annual	County Clerk	County Seat	50c	....
Utah	1915	....	Annual	Secretary of State	Salt Lake City	\$5-\$15	....
Vermont	1908	1913	Annual	Secretary of State	Essex Junction	\$2 H. P.	\$2.00
Virginia	1910	....	Annual	Secretary Com.	Richmond	*\$5-\$20	....
Washington	1905	1913	Annual	Secretary of State	Olympia	\$3-\$7	....
West Virginia	1911	....	Annual	State Auditor	Wheeling	\$10	....
Wisconsin	1911	1913	Annual	Secretary of State	Madison	\$5	....
Wyoming	1913	....	Perpetual	Secretary of State	Cheyenne	\$5	....
District of Columbia	1906	1914	Perpetual	Auto Bd.	Washington	\$2	\$2.00

*The following notations are important in connection with the table above: **Alabama**—Fees, 20 horsepower, \$7.50; 20-30, \$12.50; 30-40, \$17.50; over 40, \$20. **Arizona**—Fees, 25 horsepower, \$5; 25-40, \$10; over 40, \$15. Chauffeur's license is perpetual. **California**—Additional charges are made for registration of motor trucks. **Colorado**—Fees, 20 horsepower, \$2.50; 21-40, \$5; over 40, \$10. **Delaware**—Family license, \$8. **Florida**—Another law provides for registration in counties; fees, 10 horsepower, \$5; 11-29, \$10; 30-40, \$20; 41-50, \$30; 51-60, \$50; 61-70, \$70; over 70, \$100. Two lamps are required from sunset to sunrise. **Idaho**—Fees, 30 horsepower, \$15; 30-40, \$20; 40-50, \$25; over 50, \$40. **Illinois**—Fees, 25 horsepower, \$4; 25-35, \$6; 35-50, \$8; over 50, \$10. Other taxes on cars are limited to \$10. **Indiana**—Fees, 25 horsepower, \$5; 26-40, \$8; 41-50, \$15; more than 50, \$20. **Iowa**—20 horsepower,

\$8; over 20 at 40 cents per horsepower for four years, then 20 cents per horsepower. **Kentucky**—Fees, 24 horsepower, \$6.25; 25-50, \$11; 50 or over, \$20. **Maine**—Fees, 20 horsepower and under \$5; 21-35, \$10; over 35, \$15. **Maryland**—Fees, 10 horsepower, \$5; 10-20, \$10; 20-30, \$15; 30-40, \$20; over 40, \$25. **Massachusetts**—Fees, 20 horsepower, \$5; 20-30, \$10; 30-40, \$15; 40-50, \$20; over 50, \$20. **Mississippi**—\$2 for license and 36 cents per horsepower; electrics, \$4.80. **Missouri**—Fees, 12 horsepower, \$2; 12-24, \$3; 24-36, \$5; 36-48, \$7; 48-60, \$8; 60-72, \$10; over 72, \$12. **New Hampshire**—15 horsepower, \$10; 16-30, \$15; 30-40, \$20; 40-50, \$25; 50-60, \$30; over 60, \$40. **New Jersey**—Fees, 10 horsepower, \$4.50; 11-29, \$7.50; over 29, \$15. Driver's or chauffeur's licenses, \$2 or \$4, according to horsepower. **New Mexico**—Fees, 12 horsepower, \$2; 12-20, \$4; 20-30, \$6;

FORCE IN EVERY STATE OF THE UNION.

Chauf- feur	Non Residents	Lights	Front	Visible Rear	Visible	Speed Regulations	Bus. Dis.	Res. Dis.	Out- side	Maxi- mum
\$5.00	Reciprocity	30 minutes	2	.....	1	50 ft. State and local	..	..	..	30
\$5.00	Six months	1 hour	2	.....	1	State	15	15	20	..
\$1.00	Exempt	1 hour	2	200 ft.	1	State	15	15	20	..
\$2.00	Three months	30 minutes	1	200 ft.	1	250 ft. State	10	15	20	..
\$1.00	Three months	Sunset	2	.....	1	Local	..	..	..	..
\$2.00	30 days	30 minutes	2	200 ft.	1	50 ft. State	..	..	25	..
\$5.00	Reciprocity	1 hour	1	200 ft.	1	State	15	25	25	25
....	30 days	Sunset	..	.....	..	Local	..	..	..	..
\$2.00	30 days	1 hour	1	100 ft.	1	Local	..	..	..	..
....	Reciprocity	1 hour	2	200 ft.	1	100 ft. State and local	..	..	..	30
\$5.00	60 days	1 hour	2	200 ft.	1	150 ft. State	10	15	20	25
\$2.00	60 days	1 hour	2	200 ft.	1	100 ft. State	10	15	20	25
....	Reciprocity	30 minutes	2	500 ft.	1	50 ft. State and local	..	..	..	25
....	30 days	30 minutes	2	.....	1	50 ft. State	10	12	20	..
\$2.00	Reciprocity	Sunset	2	200 ft.	1	State and local	10	15	20	..
....	Reciprocity	Local regulations	.....	..	.....	Local	12	..	..	..
\$2.00	30 days	30 minutes	2	.....	1	State and local	10	10	25	..
\$5.00	14 days	1 hour	2	200 ft.	1	State and local	12	12	18	25
\$2.00	10 days	30 minutes	2	200 ft.	1	60 ft. State	10	15	20	..
\$2.00	Exempt	1 hour	2	200 ft.	1	State	10	15	25	..
\$1.50	Reciprocity	1 hour	2	200 ft.	1	50 ft. State	15	15	25	..
....	60 days	.....	..	.....	..	Local	..	..	..	..
\$1.50	30 days	30 minutes	2	200 ft.	1	State and local	8	8	8	25
\$2.00	Reciprocity	1 hour	2	200 ft.	1	.....	..	..	..	..
....	30 days	1 hour	1	.....	1	State and local	12	12	12	25
....	30 days	1 hour	2	.....	1	Local	..	..	..	..
\$5.00	10 days	30 minutes	2	200 ft.	1	50 ft. State	15	15	25	30
\$2-\$4	15 days	30 minutes	2	250 ft.	1	50 ft. State	12	12	25	..
\$1.00	60 days	30 minutes	2	200 ft.	1	50 ft. Local	..	..	..	30
\$5.00	Reciprocity	30 minutes	2	200 ft.	1	50 ft. State and local	..	..	..	30
....	15 days	30 minutes	2	.....	1	50 ft. State and local	10	15	25	..
....	Exempt	.....	..	.....	..	State and local	10	10	30	..
\$3.00	Reciprocity	30 minutes	2	200 ft.	1	State	8	15	20	20
....	Reciprocity	Local	..	.....	..	Local	..	..	..	..
....	30 days	1 hour	2	200 ft.	1	State	..	..	..	25
\$2.00	10 days	1 hour	2	200 ft.	1	State	..	..	..	24
\$2.50	10 days	1 hour	1	.....	1	State	15	15	25	25
....	No provisions	.....	..	.....	..	.....	..	..	..	..
....	Reciprocity	30 minutes	2	200 ft.	1	Local	15	15	25	25
....	Exempt	.....	..	.....	..	Local	8	15	20	20
....	No provision	.....	..	.....	..	State and local	8	8	18	..
\$2.00	30 days	1 hour	2	200 ft.	1	State	10	15	20	..
\$2.00	Reciprocity	45 minutes	2	200 ft.	1	50 ft. State	10	10	25	..
\$2.50	14 days	1 hour	2	100 ft.	1	State	8	8	20	..
....	Exempt	1 hour	2	200 ft.	1	200 ft. State and local	12	12	24	30
\$2.00	Reciprocity	1 hour	2	.....	1	State and local	10	15	20	..
....	Reciprocity	30 minutes	2	.....	1	State	15	15	25	..
....	No provision	.....	..	.....	..	State	..	..	..	..
\$2.00	Reciprocity	30 minutes	2	200 ft.	1	.....	12	12	15	15

30-40, \$8; 40-50, \$10; over 50, \$12. **New York**—Fees, 25 horsepower, \$5; 25-35, \$10; 35-50, \$15; over 50, \$25. **North Carolina**—Fees, 25 horsepower, \$5; 25-40, \$7.50; over 40, \$10. **Oregon**—Fees, 26 horsepower, \$3; 26-36, \$5; 36-40, \$7.50; over 40, \$10. **Pennsylvania**—Fees, 20 horsepower, \$5; 20-30, \$10; 30-40, \$15; over 50, \$15. **Rhode Island**—Fees, 5-20 horsepower, \$5; 20-30, \$10; 30-40, \$15; over 40, \$25. **Utah**—Fees, 25 horsepower, \$5; 25-40, \$10; over 40, \$15. **Virginia**—Fees, 20 horsepower, \$5; 20-45, \$10; over 45, \$20. Non-residents are exempt for two periods of seven days each. **Washington**—Fees, 25 horsepower, \$3; 25-40, \$5; over 40, \$7.50. **District of Columbia**—The police have special regulations regarding speeds permitted on certain streets. From some streets in Washington automobiles are excluded.

The above table and the accompanying notations are

held to present the essential features of the motoring laws in the various states as applying to tourists, although several of the states permit local ordinances and regulations. Practically all laws now provide for good and efficient brakes, suitable horn or other signalling device, and that the rear lamp shall display a red light toward the rear and a white light illuminating the number plate. Connecticut, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, Pennsylvania, Rhode Island, Vermont and Washington forbid the use of the muffler cut-out. Tire chains are not permitted on certain surfaces, unless the roads are in a slippery condition, in Delaware, Michigan and New Jersey, while Montana expressly requires their use when the road surface is in an unsafe condition.

PREPARING THE CAR CHASSIS FOR TOURING.

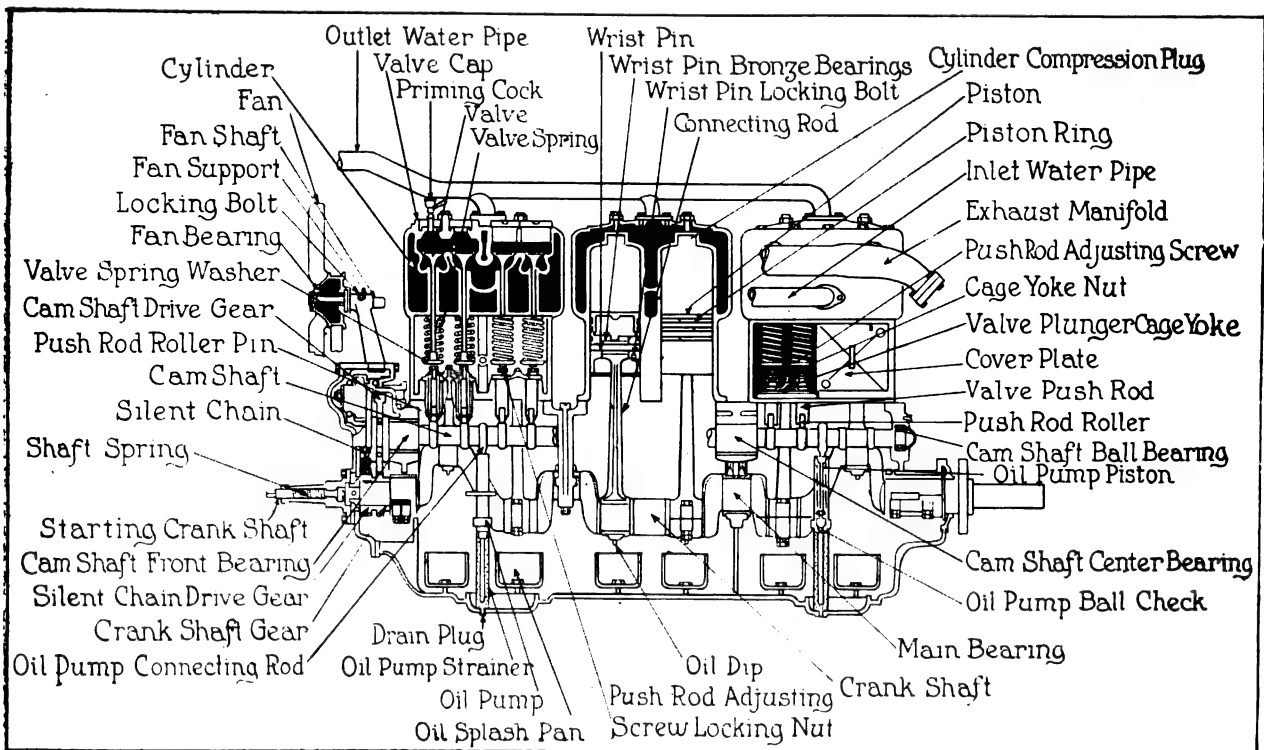
The Systematic Inspection of All Points of Wear and Adjustments that Should Be Made to Insure Efficient Operation and Constant Service.

WHETHER the tour be for a week end or for a considerable period, practically all its pleasure is dependent upon the vehicle. If it is in good mechanical condition there is no reason for delays, there will be no occasions for annoyance, and the expense will be minimum. These are all factors of importance and worthy of consideration by any motorist, no matter how experienced. With the assurance that comes from a car that is well equipped and operating

ing it in that condition during the journey, but by knowing before ascending or descending a grade that the brakes are certain to hold the car. There are minor mishaps that are reasonably certain to eventuate, such as tire punctures, but the possibility of these is understood and are not regarded as the results of unpreparedness.

Need of Careful Preparation.

The man who is about to tour can undertake the work himself, or have it done for him. He



Sectional View of Six-Cylinder Motor, Showing the Different Components and Their Relation to Each Other.

normally, one may travel long distances in comparatively short time and can enjoy the entire holiday, while the monetary difference is sufficient to justify thoughtful preparation.

The tourist must understand that he will undoubtedly traverse unknown roads, where power capacity is necessary and good brakes are imperative. The intelligent driver discounts the unknown highways by not only having his machine mechanically fit at the start and by keep-

ing it in that condition during the journey, but by knowing before ascending or descending a grade that the brakes are certain to hold the car. There are minor mishaps that are reasonably certain to eventuate, such as tire punctures, but the possibility of these is understood and are not regarded as the results of unpreparedness.

One should remember that the transient cus-

tomers generally pay more for a service at a garage or public service station than a regular patron, that a work may be temporary rather than permanent, that adjustment of a failure or defect expected from an agent cannot be given by even another representative of the maker of the car, and that hasty repairs are not always satisfactory.

The owner about to tour should not take anything for granted. He should know his car thoroughly and should make such preparation that its operation at normal capacity is certain. The following suggestions are made from experience, and will direct the attention of the tourist to what had best be done to insure the mechanical condition of the machine. The car should be systematically examined and its operation carefully noted, and with these observations the work can be undertaken with certainty:

The first component to be given attention is the motor. If the car is not overhauled the motor work may be done without removing it from the frame. The valves should be reground, whether or not the compression is weak. Valve grinding requires time and patience. One should first determine if the valve heads and the stems are warped or bent, as true seating if these conditions obtain is almost impossible. When seating a valve that is badly pitted do not use unnecessary pressure on the grinding tool. This is advised against, as the grinding compound may scratch the valve seat. When a valve is deeply pitted it should be placed in a lathe or drill and the surface smoothed with a very fine file. If the valve seat is deeply pitted it will be necessary to form a new seat with a reseating cutter.

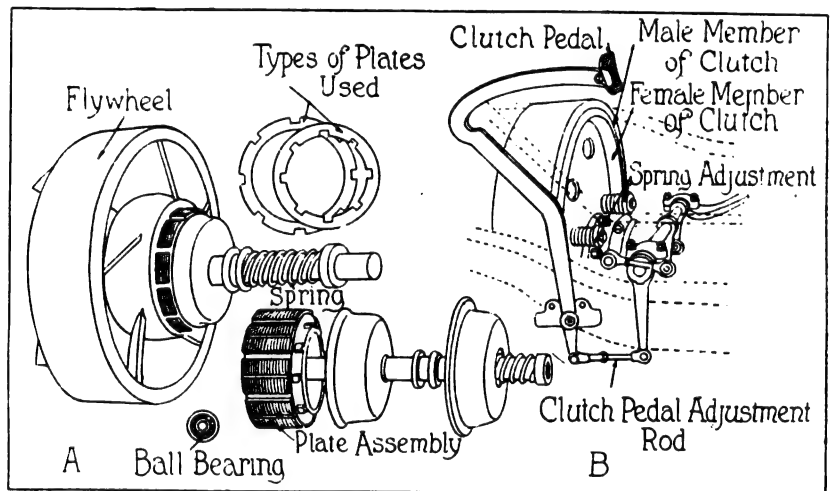
The valves can be ground with slight pressure on the grinding tool. Do not pass any valve as ground until a bright circle appears for the entire circumference.

The carbon in the cylinders must be removed. If the cylinder head is not removable, it is advisable to employ the oxygen method for this operation, as the carbon can be burned out for slight expense. To insure even distribution of power and quietness of operation, there must be close adjustment of the valve stems and the push rods. The clearance between them should be about the thickness of an ordinary name card when the piston is at dead centre. When necessary adjust-

ment may be made by loosening the lock nut on the plunger and turning the adjusting nut to the left. When relationship is correct the lock nut must be securely tightened. Before replacing the valve caps, coat the threads with a paste of graphite and oil. Now try the compression, and if it is found to be strong the valves have been properly ground and the piston rings are fitting perfectly.

The Bearing Adjustments.

The bearings must be given attention. If the owner is not competent to do this work he should obtain the services of an experienced man. Several types of engines, especially those recently built, are fitted with plates at the side of the crank case, which may be removed to examine the connecting rods. If the motor is not of these types it will be necessary to drop the lower half



Adjustments of Two Types of Generally Used Clutches: A, Multiple Disc Clutch Assembled and Disassembled; B, Cone Clutch and its Components.

of the crank case. The relief cocks on the cylinder heads should be opened and each rod tested for up and down play. The owner should not be deceived by side play, as this is imperative for lubricating and alignment and is to be found in nearly all makes of motors. However, if there is up and down play, this must be remedied.

Between the upper and lower parts of the rod bearing on the crankshaft will be found several thin shims and adjustment can be made by releasing the retaining bolts and removing the shims until the bearing is tight. If the rod is a marine type, an equal number must be taken from each side. The rods are subjected to the greatest strain of any part of the motor and the retaining bolts must be securely fastened and locked.

The main bearings can usually be examined by placing a jack under the flywheel. This releases

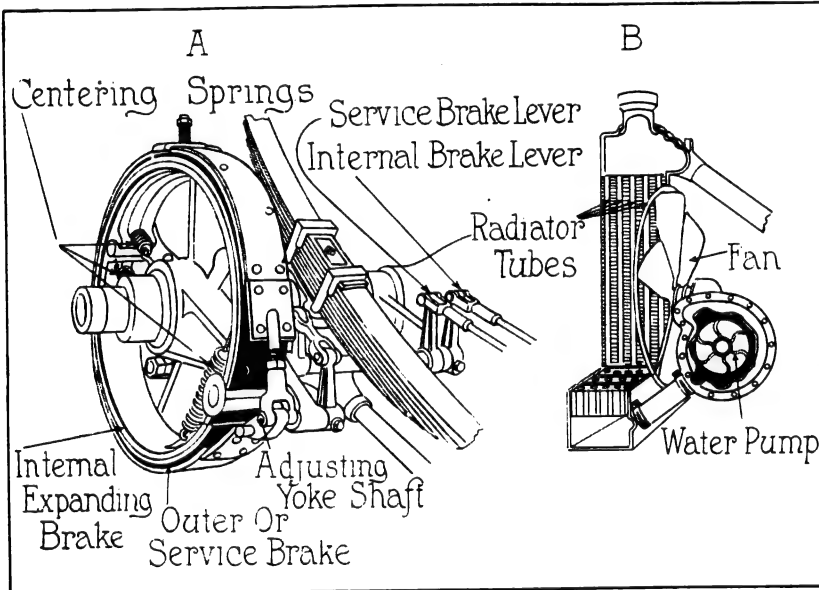
the weight of the heavy wheel and if there is play at the front bearing it may be felt by shaking the crankshaft with the hand. These bearings are usually shimmed and can be adjusted after the same manner as the rods. Test the camshaft, by shaking it. If play exists it will generally be in the end bushings. Worn bushings cause lost power, as the valves are not lifted to full height. New bushings are the only possible repair. Next ascertain if the teeth of the cam and crankshaft gears are in good condition and properly mesh. Drain the oil from the crank case and flush it thoroughly with kerosene or gasoline, preferably the former, and fill it with fresh lubricant.

Drain the water from the radiator and flush

there. If the float is cork, it should be given a few coats of shellac to insure that it will not become gasoline soaked. Place new gaskets between the manifold and the carburetor and between the cylinders and the manifold. Before coupling the gasoline line to the carburetor, turn the fuel on at the tank and allow it to flow through the pipe. This will usually release any substance which may have settled in it.

The best adjustment of the carburetor is obtained when the motor operates smoothly while using a large volume of air. As carburetors are adjusted differently, it is impossible to give any standard rule. Usually an instruction sheet from the manufacturer can be obtained and by keeping the above principle in mind, good adjustments can be made.

The ignition system may require the greatest attention and it should be carefully examined and tested. As a precaution the magneto magnets should be tried to learn if they are fully charged. An efficient magnet will lift a 15-pound weight. The weight, however, must be iron or steel, as copper, brass, tin or zinc cannot be attracted by magnetism. The carbon brushes of the distributor and the collecting brushes of the armature should be smoothed with a fine file or emery paper. If the brushes are short or the springs weak, they should be replaced. Examine the platinum contact points in the breaker box for



A, the Means of Adjusting Relations of Internal and External Brake Shoes;
B, the Radiator and Pump of Conventional Forced Water Circulation.

it with a soda solution. The best method is to pour in the liquid and start the motor. After it has run for a few minutes open the pet cocks and drain the solution, after which the system is filled with water, the engine driven and the radiator again drained. This will displace any sediment.

Next test the fan belt for a loose belt will greatly decrease the speed of the fan. Examine the fan blades to learn if they are bent. If the water is circulated by pump, this should next be given attention. It is a good practise to place new material in the packing nut, so as to provide for several adjustments. Replace any part of the pump that is worn and shellac the gasket before replacing the cover.

Remove the carburetor and subject the several chambers to air pressure, which will force out any foreign matter which may be lodged

looseness and pit marks.

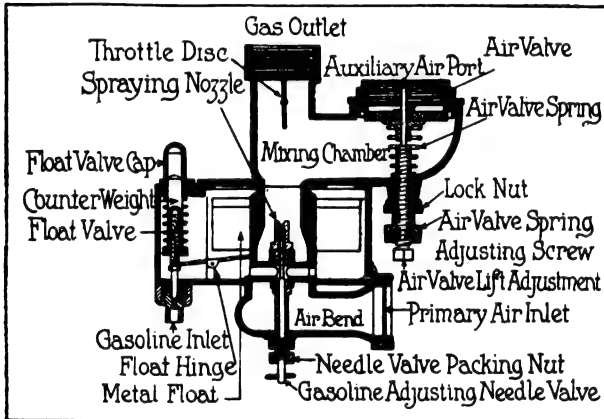
The storage battery should test to the full charging point and contain a full volume of electrolyte. In replenishing the electrolyte only distilled water should be used. After securing the terminals, examine the wiring insulation throughout the system for breaks and for water or oil saturations, for these may cause short circuiting that may be difficult to locate. It is not a bad plan to apply a few coats of shellac to the cables.

The spark plugs should be wholly disassembled and cleaned, and the porcelains examined for cracks. The adjustment of the electrode points vary for different systems, but $1/32$ of an inch is not a bad minimum. Solder every wire terminal rather than take chances with makeshift taped winding.

If the clutch is combined with the gearset in a

planetary type power transmission, the clutch will need little if any attention, unless badly worn. The low and reverse speeds are controlled by bands. If these are so worn that adjustment is impossible, it will be necessary to reliné them. A common form of high-speed multiple disc clutch is operated by small bell cranks carried by a spider, which press against the disc or cone. A small sliding cone is used to expand these fingers or cranks so that they force against the disc. Adjustment is obtained by loosening the nuts on the spider and then screwing the latter nearer to the discs.

Two types of clutches are extensively used with sliding gear transmission systems. The multiple disc clutch will no doubt require cleaning, which is easily done by draining the oil from the case and filling it with kerosene. The clutch should be engaged and disengaged several times,

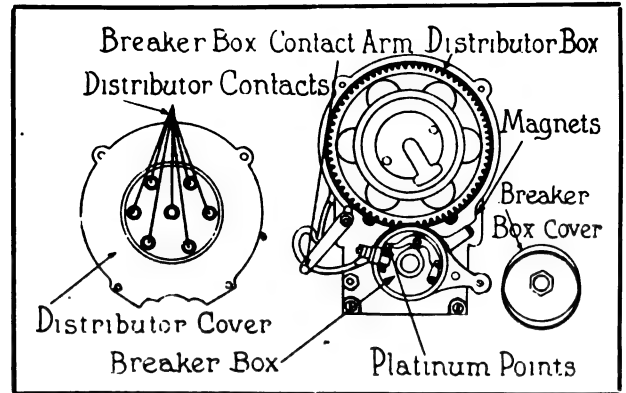


The Members of a Standard Type of Automatic Float Feed Carburetor and Their Relation for Normal Service.

after which the case should be drained and re-filled with oil. A good grade of medium cylinder oil should be used. If the plates do not readily take hold when the clutch is engaged, adjustment may be made by screwing up on the nut behind the heavy coil spring, thus increasing its tension.

The lining of a cone clutch should be examined and if worn it should be replaced with a new band. If a new facing is fitted it should be given several applications of castor oil to make it soft and pliable.

Remove the lubricant from the gearset case and thoroughly wash the case and gears with gasoline or kerosene. Drain off the fluid and examine the different parts. The gear shafts should be tried for end play and if necessary take up the bearings at the ends. Determine whether the sliding gears mesh for the full surface with the stationary gears on the countershaft. Some cars



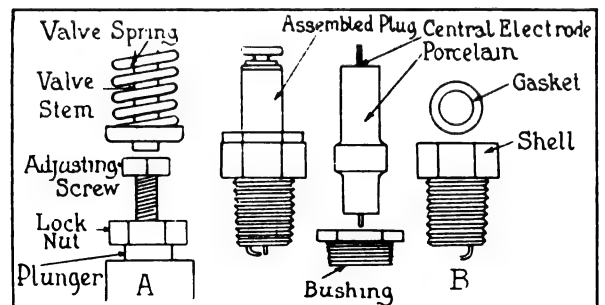
The Breaker and Distributor Boxes of the Magneto and the Means for Breaking and Distributing the Electric Current to the Motor.

have long rods connecting the gear shifter with the lever and as this necessitates using two or more pins, which are subject to wear, the pins may need adjustment.

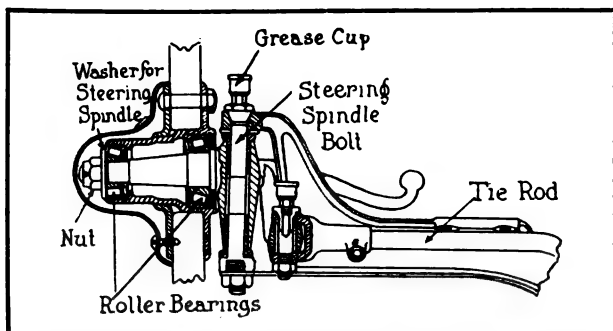
The universal joints may cause trouble if neglected. The outside cover should be removed and the parts thoroughly cleaned. The best remedy for worn parts is to replace them. After cleaning the joints pack them with new lubricant.

Care of the Driving System.

The drive shaft and differential may need no other attention than cleaning and filling with lubricant, although it is possible that the relationship between the pinion and the ring gear may need correction. This adjustment requires more or less skill and so particular care must be taken. Remove the housing cover and jack one of the rear wheels. Except on the very highest priced cars there is generally a high point of contact between the two gears, and so the wheel should be turned until this point is found. The adjustment must be at this point. On most cars there are two adjusting collars, one on either side of the differential housing, and these may be loosened and turned either way as the condition may require. If the car has been used some time



A, the Usual Method of Adjustment of Engine Valves and Tappets; B, the Parts of a Standard Type of Spark Plug Disassembled.



The Bearings of the Wheel Spindle and the Bushings of the Steering Knuckle Pivot, the Points of Wear and the Means of Adjustment.

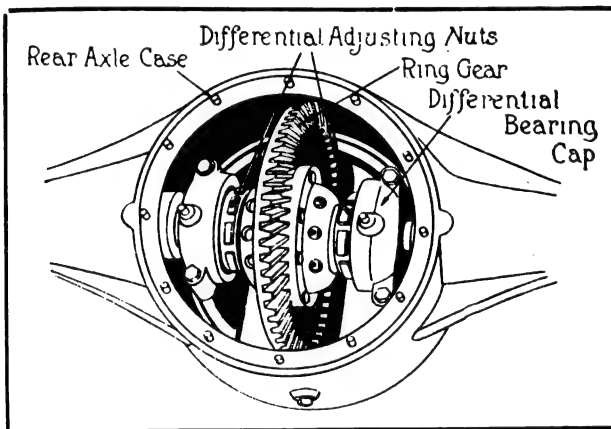
it will be well to determine if the bevel gears are firmly fastened to the axles. The usual method of retaining these is by keys and pins. If the axle is a full floating type, the axles fit into sockets in the hubs of the gears and there may be wear at this point. If there is much play it may be advisable to install new shafts which have larger square ends, or new keys to fill the sockets.

As the wheels and bearings will be subject to severe stresses, these should be carefully examined. Jack the car and remove the wheels and bearings. Wash the bearings and look for cracked or broken balls or rolls. Pack the bearings well with grease before replacing. There is opportunity to examine the brake linings while the rear wheels are off. If the linings are worn they can be replaced with new at very little cost. Inspect the felt washers on the rear axle, and if caked or worn, new ones should be used. Replace the wheels and adjust the bearings on the front axle until the wheels turn freely. The brake action on the rear wheels should be tried. It is essential that the pressure of the brake shoes be applied equally. With the front of the car raised, try to rock the front wheels by gripping them at the top and at the bottom. If there is play the bushings in the axle are worn and these must be forced out and replaced. The jack pin is generally hardened and wears slowly, but as a

matter of precaution it should be examined.

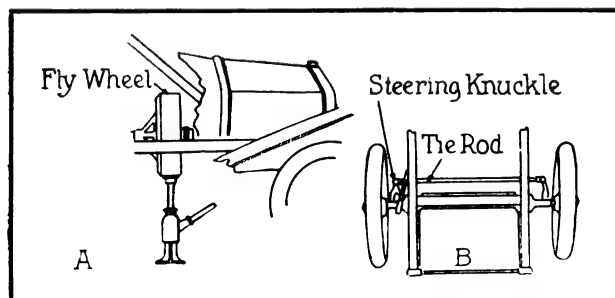
Nothing is more annoying than spring squeaks, which can be prevented by lubrication. Loosen the clamps and pry apart the leaves with a screw driver. A leaf separator can be purchased if one desires at a trifling cost. Scrape all rust from the spring leaves and lay a quantity of flake graphite on each leaf and spread it for the full length with a feather. The effect will be surprising. The torsion, radius and torque members must be given attention to make sure they are in correct relationship. If the rear construction is supported by truss rods, these should be tested for looseness. They should be set up snug, but not too tightly, and the cotter pinned.

These are of two types of steering gear, direct and irreversible. As the adjustment of these vary greatly, precise instruction for adjustment cannot be given, but as provision for adjusting is al-



The Points of Adjustment of the Conventional Bevel Gear Differential with Relation to the Driving Shaft Pinion.

ways made, this can be discovered by a little study. The steering wheel should be examined to see that the key has not become worn or loose. In the body one should look for causes for rattles. The proper repair for a loose door is to have it refitted, but an effective remedy is to attach a strip of leather of sufficient thickness to the door post to prevent play. Tighten all the nuts that retain the top and the windshield and as a last precaution see that the body is securely fastened to the frame.



A, Jacking a Flywheel to Ascertain Condition of Crankshaft Bearings; B, the Tie Rod Adjustment for Wheel Alignment.

The governments of the Netherlands, Honduras, Argentine and Italy have purchased Studebaker cars for the use of their representatives at the Panama Pacific Exposition. The United States government operates two Studebakers for the same purpose and uses a Studebaker mail wagon to carry mails to the model postoffice which is maintained on the grounds.

SMART APPAREL FOR THE TOUR.

**Distinctive and Practical Garments Designed Especially for This Season's Tour,
Combining Comfort and Style for all Occasions.**

(By E. M. D. Kiely.)

EVERY feminine member of the motoring world knows that the selection of the proper wearing apparel for the tour is a very important matter. She also knows that this season there is the widest range of styles and materials ever offered for her inspection. In the matter of styles nearly every woman is guided by her individual taste, but in the matter of materials she should be influenced either by her own experience or the experience of others.

At this time of the year, when the days are warm, garments of light weight are most suitable, but they should be of a texture that will insure warmth when the temperature suddenly changes, as it is prone to do in the varying altitudes through which the average tourist's itinerary leads. While stylish, they should also be serviceable and enduring, for the wear and tear is greater on a long touring trip than in the ordinary pursuits of pleasure. While it is most important that they should answer the purposes of the tour, they should, at the same time, be sufficiently distinctive to make them appropriate for more formal occasions.

It is not necessary to carry much baggage containing articles of wear, as this will be found to crowd the car, and detract to a degree from the comfort of automobiling. In this article is illustrated and described a number of choice and carefully chosen garments suitable for women's wear, which are both practical and stylish.

Owing to the conditions prevailing abroad, the majority of Americans will this year confine their vacation tours to this country, and conse-

quently will choose their wearing apparel at home. The modes this season, while new and different, are also exclusive and appeal to the woman of taste, and the motorist need experience no trouble in selecting garments either for touring, street wear or for social functions. Dame Fashion, always so busy, has created some beautiful and charming innovations in wraps, and it is not difficult for a woman to make a choice and suitable selection for her requirements in any of the large city stores.

The woman who demands smart clothes will have her desires satisfied, for in Fig. 1 is shown an attractive model, made of Palm Beach cloth, which is the very height of fashion. The material in this coat is put to many uses in the making of other appropriate automobile garments. It is full length, cut with large, slit pockets, has a dainty belt demarking the waistline, and is finished with buttons just above the hips and in line with the pockets. The belt keeps in place the graceful fullness of the coat, giving it a smart touch. A roll collar of the same material finishes the coat, and this may be worn high or low, according to individual taste.

This garment is one of the season's smartest offerings, and affords the wearer the opportunity of donning a suit or woollen dress underneath, which many women tourists require. It also keeps the under garments free from dust at-

tending long driving, thus answering two purposes. The price of this wrap is most reasonable, being \$7.50, and it already has found favor with women of good taste, on account of its thorough practicability.



Fig. 1—Attractive Model of Palm Beach Cloth, Belted Effect—Hat of French Felt in White.



Fig. 2—Slip On Wrap of Faille Silk with Collar of White Silk Poplin—Hat of Satin in All Colors.

torist a veil is one of the first requisites for touring purposes, as driving in the open air tempts the breezes to disarrange her coiffure. A veil worn over the hat and securely fastened under the chin eliminates this annoyance and gives comfort and pleasure to the owner.

The pretty veil shown in the illustration is known as "Watch Your Step" style, and is made of chiffon cloth in all the new and desirable shades, each veil finished with a smart black and white checked border. It retails at \$2.85.

Numerous and diversified as the season's creations may appear, there are those who are desirous of obtaining garments that have a touch of exclusiveness, and at Fig. 2 this is shown.

This coat is exclusive and is of the slip on type, which may be used for motoring or street wear. It is made of choice novelty striped faille silk, the colors being navy blue or black. The collar is in the smart cape effect, and is made of white silk poplin and harmonizes with the color scheme of the coat. The lapels of this garment may be worn opened or closed securely at the neck, according to the taste of the wearer. The models are mostly in belted effect, beau-

To make the outfit complete, the hat worn with this coat is of the French felt type, which has a soft, straight, drooping brim, and is made in white and colors, the colored hats having white or black ribbon bands around the crown. This hat is very tasteful for automobiling, being light and cool, and at the same time suitable for wear with the outer wrap. It is an inexpensive hat and sells for \$3.50.

To the average woman mo-

tifully finished with stylish buttons, large patch pockets and deep cuffs. The garment is cut in the popular three-quarter length and is sold for \$16.50.

A chic hat seen in the illustration is very useful and becoming for travelling or street wear. It fits snugly to the head and is made of satin and comes in white, black and all the new desirable colors. This hat also comes in black velvet with white or colored satin facing, which harmonizes with the coat and gives a touch of beauty and simplicity, the keynote of all well dressed women. The hat retails for \$4.50.

A dainty white silk Shetland veil may be worn. It has a narrow border, fashioned in the lace effect, and is one of the newest accessories in automobile apparel, and is sold for \$1.50.

Decidedly interesting and advantageous are the radical changes over the garments of past seasons.

The wide skirt of the model shown at Fig. 3 is now in keeping with the added width of this season's dress skirts. It is much easier to step in and out of the car than formerly, which is a decided change in the fashion of women's clothes. This is a fall model, and coats show a marked change in style. It is the fashion advocated for autumn wear and consequently will prove popular. It is cut on the military lines so prominent just now, and comes in a choice, all-wool, double-faced blanket material, woven in black and



Fig. 3—New Fall Model of Double-Faced Blanket Material, Military Effect—Hat of Corded Black Velvet, Faced with White Hemp Straw.

white and brown and white checks. It is of the full length type, with the wide, effective skirt, accompanied by a smart belt, accentuating the general appearance of this model. The military cut collar is finished with two large buttons of the same cloth as are the front and the attractive cuffs. Large patch pockets give the finishing touches to this coat. It sells for \$29.50.

The hat is of the corded black velvet style, faced with white hemp straw, and retails for \$5.50. This outfit has special attraction for the woman who tours in the cool, mountainous regions, it being especially adapted for these purposes and gives the wearer a sense of satisfaction and comfort.

So many variations are offered that each woman may express her individuality in her dress. A very striking adaptation of one of the latest models is seen in Fig. 4. It is simple, yet attractive, and is as desirable for motor-ing as well as for more formal occasions. This striking wrap is made of an all-wool mixture and is lined throughout with black and white striped silk, or plain self-color silk. It is the full length style and roomy, affording the wearer comfort and ease when touring or walking. The smart patch pockets, trimmed with fancy bone buttons, as are the cuffs, give a smart and individual touch to the garment and to the owner. This model is priced at \$29.50.

Accompanying this selective model is an up-to-date hat of black velvet, with white stitching, the crown being trimmed with a nobby white cord. The brim forms a protection for the eyes of the wearer from

the glare of sun on scorched highways. This attractive hat retails for \$3.75.

Bright and gay in color, with style and exclusiveness of design, is the new motor or beach coat illustrated at Fig. 5, which is made of corduroy in all of the new and the desirable shades.

Very stylish and becoming is this coat, it being of the three-quarter length, adorned with patch pockets, finished with a belt, and trimmed with large pearl buttons. An effective cuff finishes the roomy set-in sleeve. The collar may be worn high or low. It retails for \$9.50.

To accompany this attractive coat a corduroy hat may be worn to harmonize with the color scheme of the wrap and may be bought for \$2.95.

It must be understood, of course, that the apparel herein described and illustrated does not include all classes of automobile wear in use by motorists. Only the styles that are principally used and which the average woman motorist demands have been shown. There are a number of others; for instance, the raincoat, which is one of the most practical and useful garments for touring. It not alone keeps out the dampness, but also protects the wearer from the dust and dirt that characterize automobiling.

The Automobile Journal is indebted for the photographs and data to Stern Brothers, 42nd street, New York City, one of the largest stores of its kind in the metropolis, which specializes in high-grade wearing apparel for women and for all occasions.



Fig. 5—Smart Coat of Corduroy in All Colors, With Hat to Match General Color Scheme.



Fig. 4—Full Length Coat of All-Wool Material, Silk Lined Throughout—Hat of Black Velvet with White Cord Trimming.

MEETING EMERGENCIES ON THE ROAD.

THE ability of the motorist to repair, at least temporarily, such breakdowns as occur during the tour, determines whether the trip is to be a pleasure jaunt or a long drawn out agony. The degree of ability will also determine whether those repairs are to be costly or economical, serviceable or undependable.

The man who is handy with tools and of a mechanical bent of mind naturally will be able to overcome the minor troubles more easily than he

should be removed from the tank, after which the patch can be soldered on. The patch should be hot when applied and should be pressed on hard, so as to work the excess solder to the outside, as seen at B.

Should it be, however, that the hole is too large for this repair, the emergency fuel supply shown at Fig. 1 can be successfully adapted to bring the car to the nearest repair shop. Disconnect the line running to the carburetor and fit a

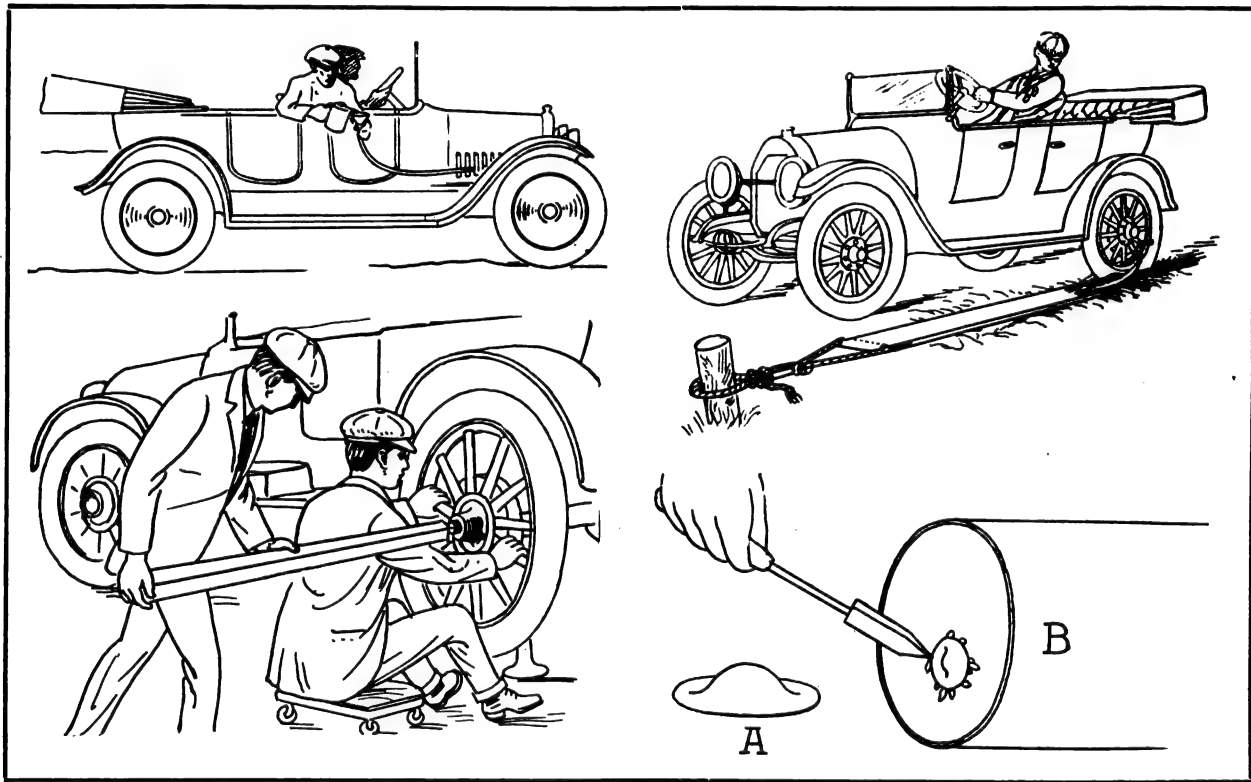


Fig. 1—Practical Repairs on the Road—Feeding Fuel When Tank Will Not Hold Gasoline—Extricating the Car—Removing Wheel Without Puller—Repairing Leak in Tank.

who is not so gifted. However, the following suggestions will be found valuable by both classes of tourists, and have been proven practical by experienced repair men.

One of the most serious mishaps on the road is injury to the gasoline tank, but this can be overcome or repaired in the majority of cases by using the ordinary units of the car's equipment. If the tank is not punctured very badly it can be made tight without removing it from the car, as is illustrated at Fig. 1, A-B. Cut out a piece of thin copper a little larger than the hole, and press in the centre as at A. Absolutely all gasoline

length of rubber tubing in its place, carrying it through the air vent in the hood to the front seat. Through a funnel fitted to the pipe end a passenger can pour the fuel, keeping the funnel well elevated to retain gravity flow to the carburetor and keeping the funnel always nearly full of gasoline.

A simple, but effective method of removing a rear wheel when a wheel puller is not at hand is illustrated at Fig. 1. Jack the wheel and remove all nuts and pins. While one person exerts a steady pull on the wheel, as illustrated, another person should strike the axle shaft a sharp blow

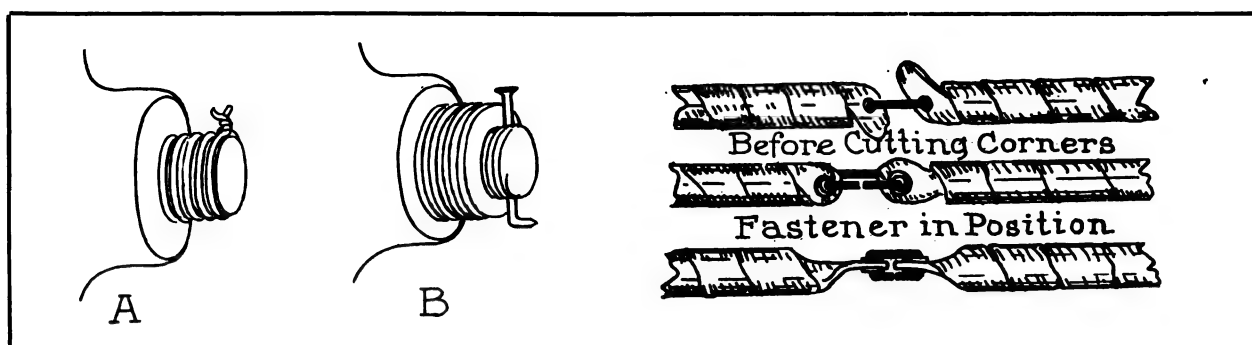


Fig. 2—A Substitute for Nuts That Have Become Lost—Making an Emergency Fan Pulley Belt.

with a block of wood, which usually will result in the wheel coming off very easily.

Another illustration of the group shows a positive means of pulling the car out of sand or mud holes. First, however, try slightly deflating the tires, which frequently will be effective. In case it fails, adopt the method illustrated. To a length of canvas, about 10 feet long and 12 inches wide, attach two short pieces of strong rope at one end and a hook for the attachment of a cable at the other. To pull the wheel out of the sand, fasten the two rope lengths around the rim of the wheel, as shown, and secure the cable end to a tree or post—a stout staple driven at a reverse angle into the ground will be found sufficient. By starting the car very slowly the wheel will wind up the canvas and the car be pulled forward. This device can be made a permanent acquisition to the car's equipment; it is economical and very easy to carry and is always ready for use.

A motor tourist should always carry a quantity of wire in his tool box, for it is an important factor in meeting emergencies on the road. When nuts become loose and are lost on the road, wire can be made to answer the purpose of the nut, as is shown at Fig. 2 A-B. A very serviceable repair can be made by winding the wire in the thread and rewinding the second layer back over the first and twisting the two ends together, as

shown at A. When the shaft or rod is drilled to receive a cotter pin, a number of washers sufficient to be packed tightly together until they reach the hole, can be slipped on the rod. By inserting the cotter pin—a large nail, bent at the end, will answer the requirements—these washers will be held in place and serve all the purposes of the original nut.

Should the fan belt become lost and another is not at hand, a satisfactory substitute designed for a grooved pulley can be easily made from twisted raw hide. The procedure is illustrated at Fig. 2. The serviceability depends largely upon the care taken in fitting and securing the ends. No ragged ends should be permitted to remain at the junction, as they have a tendency to work the belt off the pulley during revolutions. Use a small leather punch in making the holes in which to insert the wire—do not use a knife, which makes a hole that will soon become ragged.

If the acetylene burner is giving trouble, examine for foreign substances that may have lodged there. It is a disagreeable operation to place it in the mouth to blow through, and is unnecessary. As shown at Fig. 3 A, start the motor and hold the burner with a pair of pliers over a relief petcock on the cylinder head. The compression of the engine will clear it of any impeding substance.

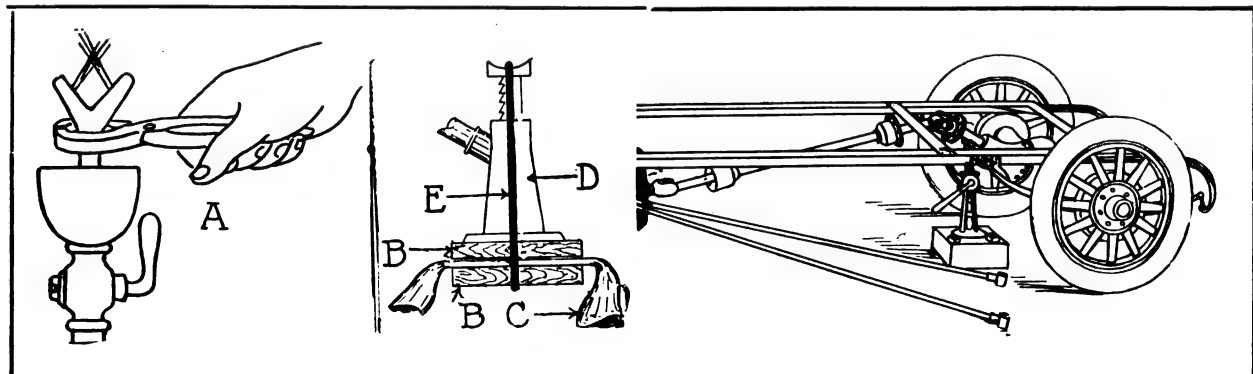


Fig. 3—Clearing the Acetylene Burner of Obstructions—Emergency Tire Press—Repairing Broken Drive Shaft Pin.

An emergency tire press can be easily constructed out of materials usually carried in the equipment of every machine. The method is illustrated at Fig. 3. Place the tube (C) between two blocks of wood (B) and station an auto jack (D) on the upper block. Bind together by running a stout wire (E) around the blocks and over the head of the jack. It is obvious that by operating the jack handle varying degrees of pressure can be brought to bear upon the tube between the blocks and the patch pressed on firmly.

Gaining access to a broken drive shaft pin or universal joint need not worry the touring motorist if he will adopt the following suggestion: On several makes of cars the universal joint is

top. The hole through the floor board should be large enough to insure adequate clearance for the plunger. The horn can be held securely by passing a metal band around it and securing the ends by bolts through the floor. This makes a convenient foot operated warning signal, and relieves the hands of the driver for other work.

A great amount of damage is done to inner tubes by not storing them properly. At Fig. 4 is illustrated a most satisfactory way of folding them. Remove the air valve and beginning at the end most removed from the valve, roll tightly, as shown at A. This will expel all the air. Next unroll and have the valve standing upright in the centre as at B. Fold the ends in, as at C, and the

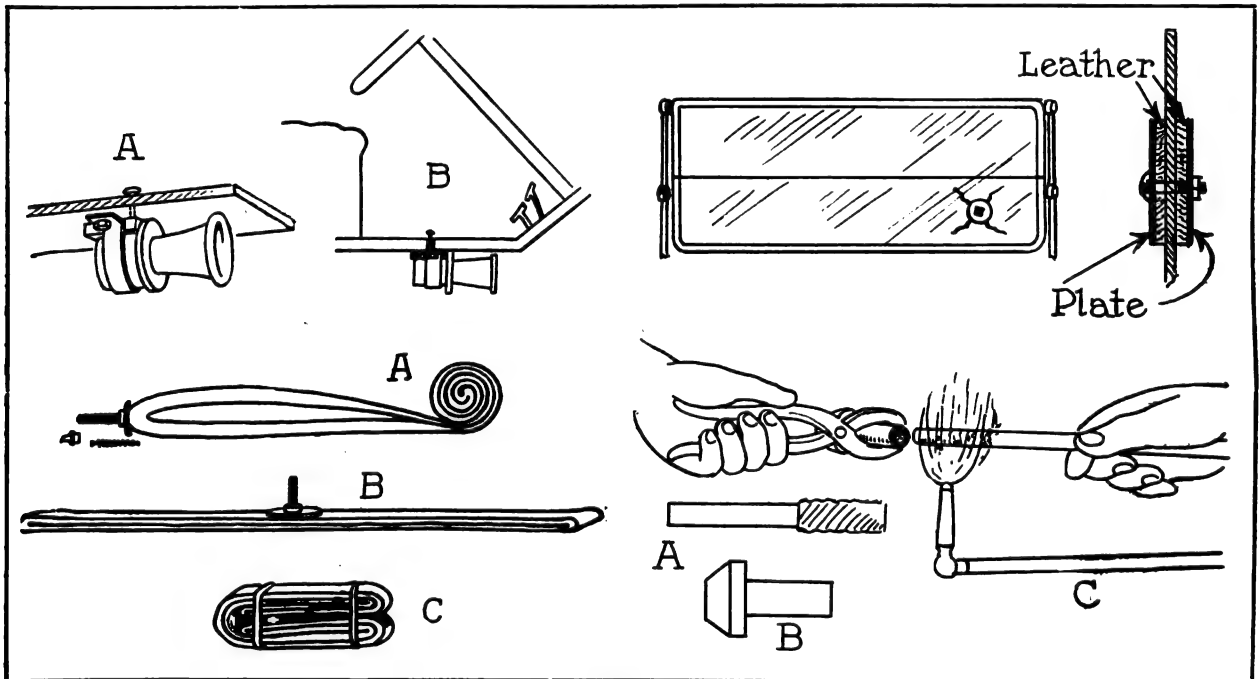


Fig. 4—Signal Beneath Floorboard for Ease of Operation—Repairing Broken Windshield—Proper Method for Carrying Tubes—Repairing the Gasoline Line.

constructed of two large steel or bronze bushings, which fit freely upon the drive shaft pin. Both universal covers should be moved back and the bushings removed. Place a jack under the front section of the differential and gradually raise it. During this operation the shaft should be forced as far forward as possible so as to favor the lifting. If care is exercised it will not be necessary to disturb the spring shackles in any way.

Ease of operation of the hand warning signal, as well as concealment, can be obtained, as shown in Fig. 4. The type of horn having the long plunger at the top can be operated by the foot if located under the floor board. If the diaphragm is larger than the body of the horn, a small piece of wood suitably shaped may be placed at the

result will be a flat package in the most convenient form for storage.

A cracked or slightly broken windshield glass may be repaired as shown at Fig. 4. Place pieces of leather on both sides of the break and over these place metal plates or washers. Through the holes in the leather and washers run a bolt, and by screwing up the nut tightly the windshield glass will be as firm and secure as before the break.

Should it become necessary to cut a gasoline line, great care must be taken in replacing the female part of the joint. One of the best methods possible is shown at Fig. 4. Smooth the end of the joint for about an inch back, as at A, and then tin the surface. Clean the end of the joint and

tin it if possible. If the car is equipped with acetylene lights, heat for soldering can be obtained by holding the pipe over the flame. As the solder melts force it into the joint, as shown at C. Additional solder for security may be placed around the outside of the pipe when it has cooled.

Sandy, wet or oily highways, or the too sudden application of brakes, are usually accountable for skidding. Although a skid is dangerous, the skillful driver can manipulate his car to equilibrium. Keep out the clutch and do not apply the brakes. A point to remember is that the front wheels should always be turned in the direction

efficient clearance for the shackle ends.

Very often the compression is weak in one or more cylinders. If it cannot be located easily by turning the motor by hand, try the following method, which not only will bring results, but will also determine the exact amount of pressure. The units necessary are shown at Fig. 5. Solder an old tire valve stem in the shell of a discarded spark plug. Screw this into the cylinder suspected of giving the trouble and start the motor. By placing a tire gauge on the valve stem the exact amount of compression can be ascertained beyond doubt.

Even though the starting crank has been lost

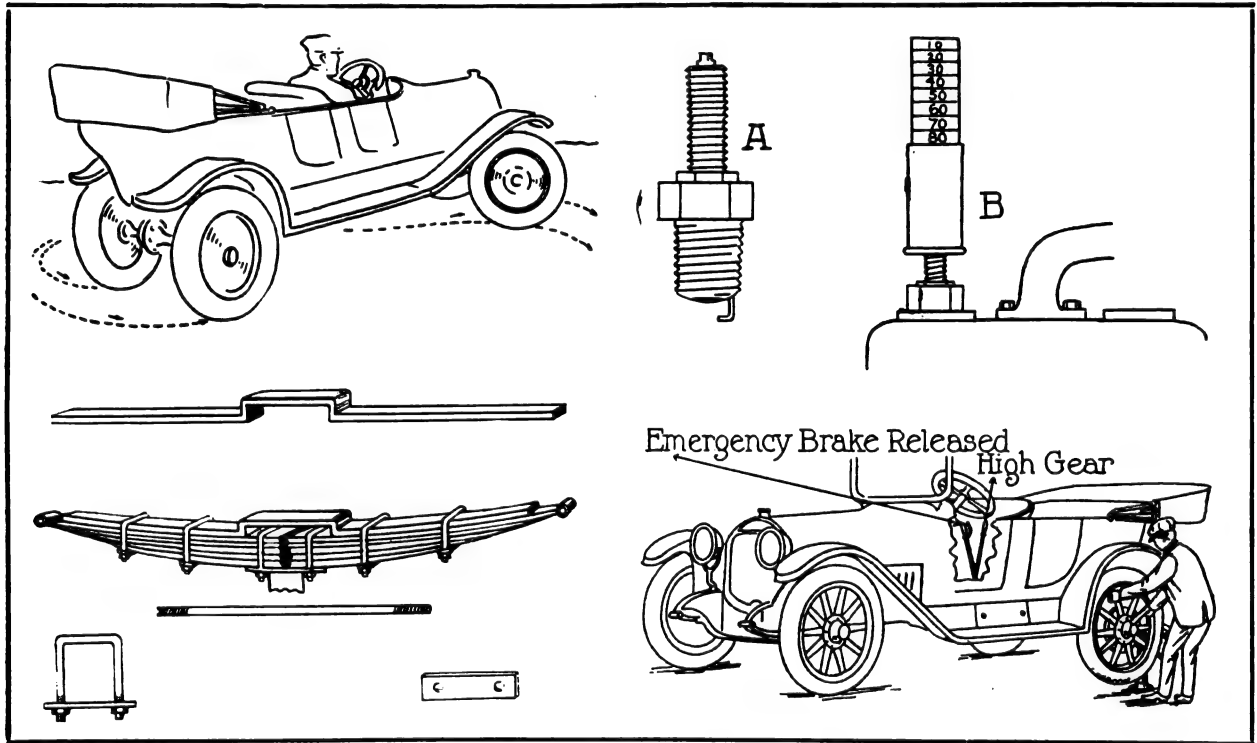


Fig. 5—Controlling the Car While Skidding—Device for Testing Compression—Repairing a Broken Spring—Starting the Motor Without Crank or Self-Starter.

in which the car is sliding, as shown at Fig. 5.

Nothing will more thoroughly disable a car than a broken spring. Consequently the motor tourist should carry the small devices shown at Fig. 5. They consist of a piece of spring steel, which is slightly shorter than the longest leaf of the spring. It is bent in the centre, as will be noted, to afford clearance for the shackle bolts. Small bolts for clamping the piece to the spring can be made from half-inch cold rolled stock and threaded at both ends and then bent. Small plates to fit under the spring and secure the shackles can be made of sheet metal, two holes being drilled in the plates and allowing suf-

and the self-starter should be out of order, locomotion can be easily resumed. Jack up one of the rear wheels and release the brakes, as in Fig. 5. Engage the high gear and revolve the elevated wheel forward. Of course when the motor starts the wheel will spin, but by placing the shifting lever in neutral it will stop. This action is obtained through the differential, the mechanism responding to the wheel offering the least resistance.

Registrations in New Hampshire amounted to 10,626 cars up to June 7. There are 239 dealers in the state.

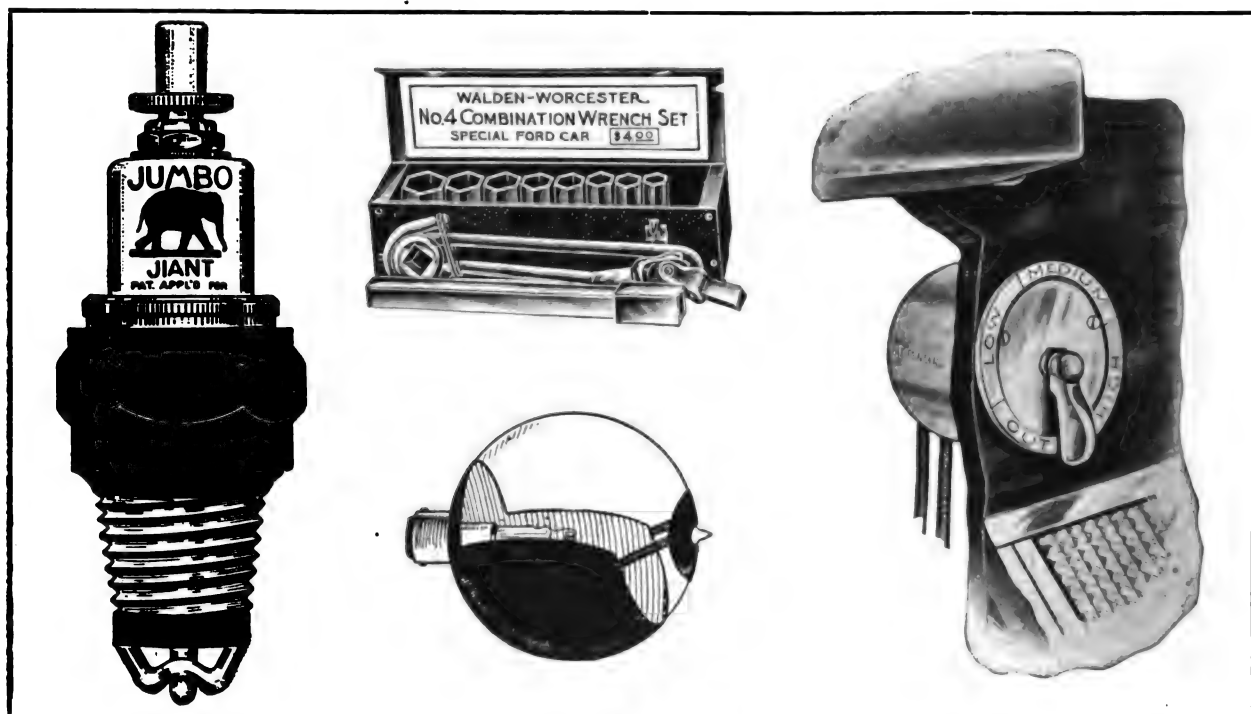
TOURING EQUIPMENT AND SUGGESTIONS.

THE highways of the country are now quite thoroughly provided with garages and repair shops, where the tourist may have repair work done. But, as numerous as they are, accidents frequently occur in solitudes far from these stations, and it is then that the motorist will most regret not having equipped his car adequately at the start. A little foresight will always repay the time and expense involved in the preparation.

It is advisable that an inventory of the equipment be made before beginning the trip. All additions do not necessarily mean the expenditure of money. As an instance, one of the most im-

in carrying. A small block of steel will be found a handy article for riveting and shaping metal parts upon. An assortment of nuts and bolts should find a place in the tool box. In connection with bolts, a practical suggestion is that the diameter of a bolt can be increased somewhat by punching a hole in the centre of the face with a centre punch. This raises small burrs on the metal, which "take hold."

A tap and die set is a necessity. With these the threads on bolts can very handily be cut as deep as desired. Other tools that will frequently be needed are files, hacksaw, monkey wrench,



Valuable Equipment for the Tour—The Jumbo Giant Spark Plug, Walden Wrench Set, House's Perrin "No Glare" and the Chaney Headlight Dimmer.

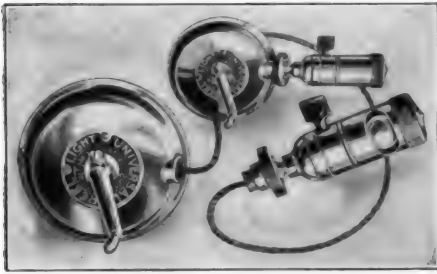
portant things is an old rain coat, which can be found among the castoff clothing. This is intended to keep the clothes clean while working around the greasy chassis, as well as to offer protection against rain and cold winds. There are a multitude of other services it can render, which the autoist will discover en route. An old pair of kid or cotton gloves will be found to be practical articles to have.

There are many occasions when a small hand vise, such as can be bought in any hardware store, will be found almost invaluable. This can be clamped to the running board for convenience

pliers, screw driver, emery cloth, medium sized machinist's hammer, cold chisel and several sizes of flexible wire. The wire may be used for several emergency repairs, such as binding joints, making cotter pins, and winding around bolt threads when a nut is lost and there is none in the tool box that will fit.

A compact set of socket wrenches which enable rapid work to be done in places that are ordinarily inaccessible is a desirable unit. Wrench manufacturers make special sets for tourists, three of which are illustrated. One consists of 37 guaranteed sockets, both hexagon and square.

and is made by the Frank Mossberg Company, Attleboro, Mass. It includes five set wrenches which have 10 openings, a universal joint for

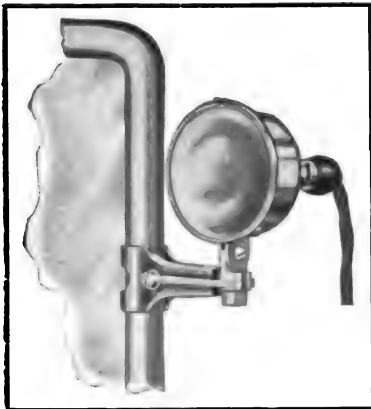


Universal Reel-Light.

sible ratchet handle, offset handle and a take down T handle. The price is \$12 for the set, which is delivered in a very convenient wooden case.

Another set illustrated is the product of the Walden Manufacturing Company, 60 Commercial street, Worcester, Mass. It is their high-grade set designated as No. 4 and retailing at \$4 complete. It is especially made for use on the Ford car. For the owner of other cars the company manufactures a tourist's set, which is known as No. 10 and sells at \$10. It includes 31 assorted steel sockets, extension bar, universal joint and three ratchet wrenches, and is particularly designed to meet practically every requirement of the tour. This outfit is packed compactly in a neat vulcanized fiber case.

Another of the very serviceable wrench sets on the market is made by the Will B. Lane Company, 180 North Dearborn street, Chicago, Ill. The construction of the Lane sockets is such that they will turn nuts set very close to an interference. They are turned out of steel bars, cold broached and case hardened. One of the sets produced consists of a handle, two screw driver bits and seven sockets. It comes in a leather case and sells for \$2.50.



Culver-Stearns Swivel Searchlight.

It is good practise to include a small soldering outfit in the equipment. If the car is equipped with gas headlights, sufficient heat can be obtained from them to heat the soldering iron.

An assortment

of wire nails will be useful, it being practical to make serviceable cotter pins from them, as well as using them as small punches. A piece of common brown soap is not only useful for cleansing the hands of grease, etc., but in emergency it will be found an adequate means of plugging leaky gasoline and oil joints. Of course, every motorist will recognize the necessity of carrying a quantity of good electric tape.

A thin sheet of steel should be carried, for from it may be cut gaskets and shims. In the case of a broken spring leaf, a proven emergency repair can be obtained by cutting a piece of steel the same width as the leaf and a trifle shorter and binding this on the bumper rubber and to the spring. This piece can be made before the start and carried along in a convenient position.



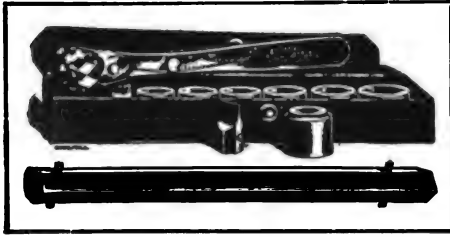
Mossberg Socket Wrench Set No. 14.

Under normal conditions engine trouble can be traced to the spark plugs. It is good policy to have spare ones in the tool box. A type of plug that has given very satisfactory service in the hands of hundreds of automobilists is the Jumbo plug, which the Gibson-Hollister Company, 3395 Washington street, Boston, Mass., markets. They are produced to be installed in all types of motors, and are made of the best of material and are guaranteed for one year from date of purchase.

Another spark plug of merit, and one that possesses an unusual constructional feature, is that sold by the Stonebridge Sales Company, Inc., 10 Wall street, New York City. It is designed so that it may be cleaned without the necessity of removing it from the cylinder.

It should be remembered that many towns

and cities through which the tourist may pass after sundown have ordinances requiring that headlights be dimmed. If the car is electrically



The Lane Unique Ratchet Wrench.

lighted and has no arrangement for reducing the strong glare, an efficient device for the purpose can be found in the Perrin "No Glare," made by the W. E. Housel Company, Buffalo, N. Y. This fits around the lower part of the bulb and also has a section at the end, fitting to the tip. The price is \$1.

A different type of dimmer is offered by the L. F. Chaney Company, Springfield, O. Three different volumes of light rays can be produced, high, medium and low. It attaches to the dashboard, close to the driver's hand. It is priced at \$3.50 and is guaranteed for 10 years.

A reliable and loud sounding warning signal is essential in the country, where the rural travellers have a tendency toward keeping to the centre of the road in their slow moving vehicles. Several firms are making efficient horns. Among the hand horns produced is one by the American Electric Company, State and 64th streets, Chicago, Ill., that has the distinguishing feature of being shaft driven, which construction eliminates all complicated mechanism. The horn handle may be mounted in five different positions, and when located at the side, as seen in the illustration, the driver can operate it with his elbow without having to release his grip on the steering wheel. This horn, designated as the Samson Tiger, has a tone regulator on the diaphragm.

An adjustable searchlight, similar to the one manufactured by the Culver-Stearns Manufacturing Company, Worcester, Mass., will be found to be a valuable adjunct to the equipment. This light will fit any car and the swivel mounting admits of its being instantly turned in any direction. It will be found valuable in deciphering road signs or house numbers at night. It sells complete for \$2.50.

Locating trouble around a motor at night with a naked flame is a dangerous procedure. Use a specially made trouble light, such as is produced for the purpose by the Cummings Brothers, Flint, Mich. It is an electric light, known as the Universal Reed Light, which when not in service

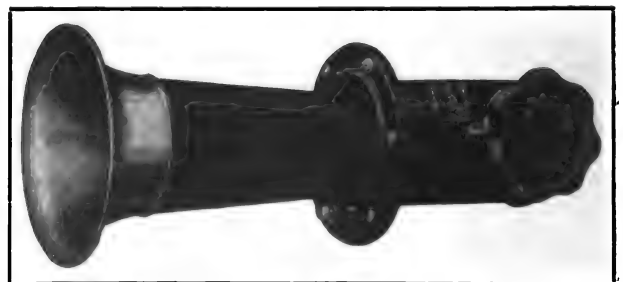
while hunting for trouble, can be used to illuminate the instrument board. It can be operated from the regular lighting system or from dry cells, and is mounted on a ball and socket joint, so that the light rays may be thrown in any direction.

Dust irritates the respiratory organs, as many autoists who are afflicted with asthma, catarrh, hay fever, etc., are aware. A novel idea in protecting the organs has been evolved by the O-Zel-O Company, Dept. A-54, Fort Wayne, Ind. It is an attachment that fits the face in such a way as to make it impossible to inhale dust and germs into the lungs. The principle is new and beneficent.

By referring to other chapters in this magazine, and to the Buyers' Reference and Guide, the prospective tourist will glean many valuable ideas on further completing his equipment so as to gain the most pleasure out of his trip. All devices listed and described are representative of the best on the market, and the motorist will find the prices moderate for the service rendered and the firms reliable and prompt.

In its house organ, which is now "Dealer" instead of "Ford Dealer" as formerly, the Auto Parts Company, Providence, R. I., announces that as the result of the suit brought by the Ford Motor Company it has been enjoined from using the terms "Ford Dealer," "Ford Accessories" or "Ford Specialties." The house organ name therefore has been changed to "Dealer" and the company's products will be advertised as "specialties for Ford cars," which does not infringe the rights of the Ford Motor Company.

Auto Comfort, the publication of the Hartford Suspension Company, Jersey City, N. J., appears in a lively and well printed edition for July. Among the new specialties mentioned is the Hartford economizer for Ford cars, which is said to cut down gasoline consumption by 35 per cent.



Manually Operated Samson Tiger Horn.

LABOR SAVING TIRE DEVICES OF MERIT.

IN THE last analysis it will be found that approximately four-fifths of the troubles which the average motorist experiences while on the road can be traced directly to the tires. This is especially true of the tourist, who generally is not familiar with the highways he travels. In large measure, however, the trouble is not with the tire, but with the driver, tire builders claiming that 75 per cent. of the mishaps are the result of misuse.

In the majority of cases the autoist has been accustomed to taking these troubles, with their consequent loss of time, discomfort and unnecessary expense, as a necessary evil. Today there is no need for this attitude with the wide range of devices being produced to obviate delays, etc., and to make the tour a real pleasure trip. While some tire accidents cannot be reasonably avoided, they can be remedied with a minimum of labor, time and cost.

One of the commonest of tire troubles is the puncture, and today it is one of the easiest repairs to be made on the road, when some modern device is used.

Illustrated herewith is a handy repair kit that should be a part of every motorist's equipment. With this kit it is possible to make a permanent, air-tight repair in less than two minutes and with a minimum of labor. The hole in the tube is spread open by means of the special tool for the purpose, and the bottom section of the plug inserted. The top section is then made tight by screwing up on a threaded wire, which is broken off flush with the surface.

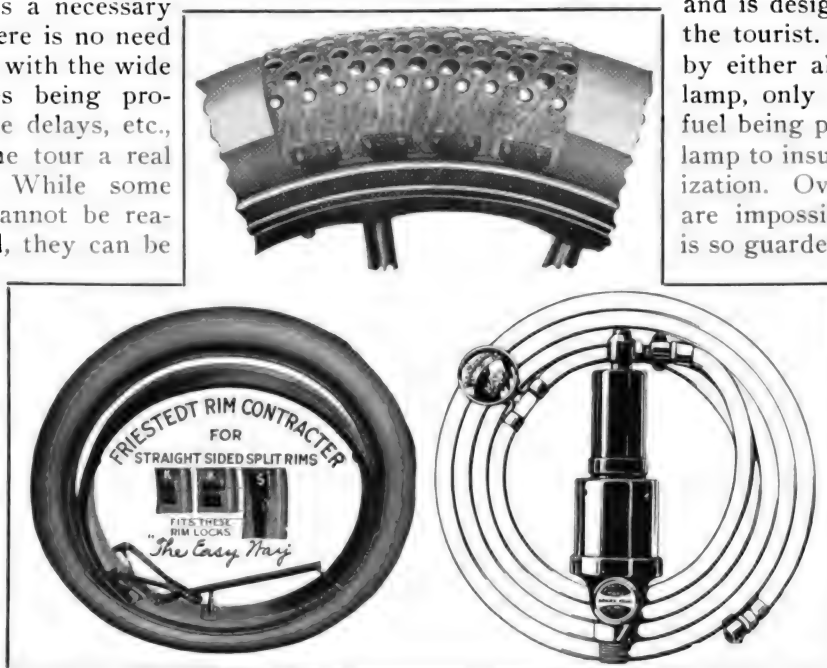
The edge of the plug cannot cut into the tube, as it is made of soft rubber and tapered. One of the desirable features of this repair is that it makes unnecessary the use of cement or of cleaning fluids on either plug or tube. It is produced

by the Stevens Company, 375 Broadway, New York City, and consists of 12 repair plugs and one special tool for rounding and distending the opening in the tube. The kit complete sells at \$2.50. A smaller set, including six plugs, retails at \$1.50.

Only a short time ago, when a tire needed vulcanizing, the motorist was compelled to send it to the repair shop. Today, however, there are vulcanizing outfits that can be carried in the car and operated on the roadside. One of the most efficient on the market is illustrated herewith,

and is designed especially for the tourist. Heat is supplied by either alcohol or gasoline lamp, only space enough for fuel being provided for in the lamp to insure perfect vulcanization. Over or undercuring are impossible, and the fuel is so guarded that it is impos-

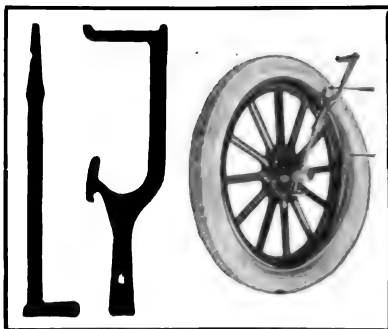
sible to spill the blazing liquid, even if the vulcanizer is upset. The blaze is not exposed, which enables its use close under the fenders without scorching the paint. It is carried in a strong telescope box, which will fit in the tool box



Three Devices That Economize Time, Labor and Money—Peerless Tire Boot, Friedt Rim Contractor and Mayo Spark Plug Pump.

easily. The Shaler Company, 250 Fourth street, Waupun, Wis., is the manufacturer, and sells it complete for \$3.50.

Tire tools not only afford ease of tire removal, but are so designed as to fully protect the casing against cutting or other mutilation. Motorists whose cars are not equipped with demountable rims will find the use of a tool like that illustrated a decided convenience. Consisting of two pieces, the tool can be adjusted to any size tire and in this particular case is said to afford quicker removal of clincher tires than by use of any other equipment. It can be obtained from the maker, the Stewart Accessories Company, 820 Warren avenue, Detroit, or its dealers, for \$1 the set.



**"Off-an-On"
Tire Tool.**

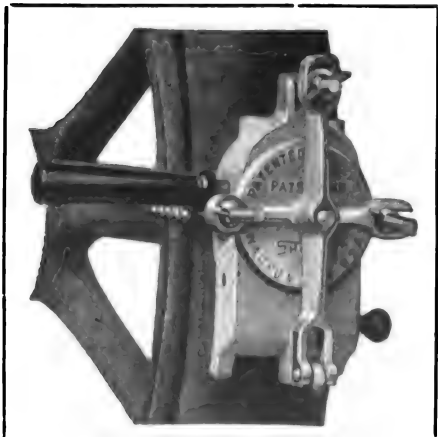
**Tool Used for Re-
placing Tire.**

the edges of the rim with two small hooks and by the use of an attached lever raises one end of the rim and overlaps the other. It does not mar the rim in any respect. The Friestedt Rim Contractor Company, 2934 West Lake street, Chicago, manufacturer, will supply the device direct or through the local agent, for the sum of \$2.

Provision against blowouts is almost as necessary as is provision of an adequate supply of fuel or lubricant. One precaution that every motorist should exercise is to lubricate the tube and inside of the casing with flake graphite, which has won great favor among racing drivers. This tends to lessen the possibilities of blowouts, through acting against friction and consequent heat, etc. But if the blowout does occur, a quick and serviceable repair can be made by applying a blowout patch.

A very efficient heavy duty blowout shoe is illustrated. It is made of the best oak tanned leather and treated by a process which makes it impervious to water. The tread is reinforced by an extra thickness of elk leather and closely set with flat headed steel studs. As made by the Leather Products Company, Denver, Col., it can

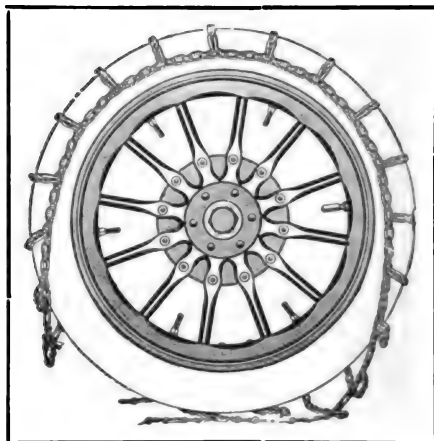
be supplied with either hook or strap fasteners for sums ranging according to size from \$1.40 to \$3. It will be found to be a very valuable adjunct to any car's equipment.



Shaler Vulcanizing Outfit for Tourists.

Wet roads

and slippery high ways are almost certain to be encountered on the tour. A large share of danger and disagreeableness can be obviated by the use of tire chains. The chain illustrated is



Weed Anti-Skid Chain.

one of the most widely used in the country, and has proven to be very effective in retaining traction. It is the product of the Weed Chain Tire Grip Company, Bridgeport, Conn., which makes them in sizes to fit any tire, and also produces extra cross chains and producers to replace the units that may become impaired.

have provided ingenious and dependable motor driven pumps that make manual labor unnecessary. One of these, the product of the Hill Valve Pump Company, 18 Kinzie street, Chicago, Ill., is illustrated and fully described in another chapter. The illustration herewith shows

Manufacturers of automobile accessories the pump produced by the Mayo Manufacturing Company, Chicago, Ill., and is one of several types. It is designed for any four-cycle motor of two, four or six cylinders. It is guaranteed to pump only fresh air and cannot injure the tire in any way. There are no parts to be adjusted, and it is sold complete with 12 feet of superior hose and pressure gauge and connections and adapter to fit any car for \$10.



Sampson No. 2 Repair Kit for Inner Tubes.

CONVENIENCES FOR THE MOTOR TOURIST.

Practical Devices That Facilitate the Operation and Maintenance of the Automobile and Make For Increased Comfort and Convenience.

THE development of the automobile accessory industry in the United States during the past 12 months has been phenomenal. Some of the best inventive genius of the country has been concentrated upon this field, with the result that there is now being produced, at remarkably reasonable prices, labor and time saving devices that will make the tour this year a trip of joy.

Every possible contingency upon the road, as well as every possible means of adding to the comfort of the motorists, has been foreseen and provided for by at least one manufacturer. In addition these manufacturers have arranged with dealers throughout the country to distribute their products so as to make it as convenient as possible for the motorist to purchase them with the least possible delay.

A majority of these devices make the tourist practically independent of repair shops in unknown districts, of expensive hostelryes, and relieve him of much of the manual labor that formerly robbed the trip of a large measure of its pleasure. Hereinafter are described some of this year's best products—obviously it would be practically impossible to describe them all, considering that there are some 3000 accessory manufacturers in this country alone. However, the selection will be found to include standard productions of representative concerns, and the list may be amplified by reference to the Buyers' Reference and Guide to be found elsewhere in this issue.

The Auto-Comfort Robe.

There is no time that a good robe is more appreciated by the motorist than when touring, for there is always the possibility of experiencing very cool or damp weather, especially in the mountains.

The Auto-Comfort Robe Company, Gloversville, N. Y., is manufacturing a robe that can be used as an ordinary lap blanket, or, should a chilling wind develop, the feet

can be slipped into convenient pockets at the bottom and the doubled over lap raised to cover the chest, as illustrated. The apron is prevented from slipping by snap fasteners, which fit it firmly to the necks of the users. Strain upon the neck is eliminated, as the weight rests in the lap. The robe has been designed to afford full protection for three people. This blanket supplies a means for protecting the whole body without having to carry extra garments. It is made in summer, fall and winter weights, of mackinaw, velour and fur, at prices ranging from \$10 upwards. All inquiries addressed to the company will receive prompt attention when this magazine is mentioned.

Kamlee Packard Touring Outfit.

Greatly increased pleasure is given the long tour by having a Kamlee Packard touring outfit as a part of the touring equipment. It is the product of the Kamlee Company, Milwaukee, Wis., manufacturer of a wide range of dust and rain proof automobile and tire trunks. All Kamlee trunks are made of three-ply basswood veneer throughout and are equipped with a patented interlocking edge that is dust, rain and air proof.

Special types of trunk are made for the several models of automobiles. The illustration indicates how a Packard can be equipped for touring purposes and shows the several units of the outfit. There are seven sole leather suit cases, which are interchangeable and are enclosed in slip covers and trunks, one tire trunk and two fender trunks for the chauffeur's use.

The left running board trunk, which bolts to the running board, contains two suit cases and has a rubber mat at the top. This retails at \$82.25. The upper trunk attaches to the lower by means of locks and straps and contains two suit cases. A water proof cover entirely encloses both trunks. The last mentioned trunk may be purchased for \$88.25.

The left fender trunk is designed for the chauffeur's use and has a door in the front. The price is \$35. A large suit case, enclosed in a water proof cover, for strapping on the fender trunk, retails at \$33.

The right running board trunk is enclosed in a water proof cover and also is fitted with a rubber mat at the top, so that the occupants of the car may step on it when alighting. This trunk contains one suit case and retails at \$59. The right fender trunk is for the chauffeur's use and retails at \$35. Two suit cases enclosed in a water proof cover may be strapped to the fender trunk and sells at \$33. A specially designed tire trunk fits the spare tires at the rear of the car. Arrangement is made for carrying hats or other articles. The price of this last is \$26.50.

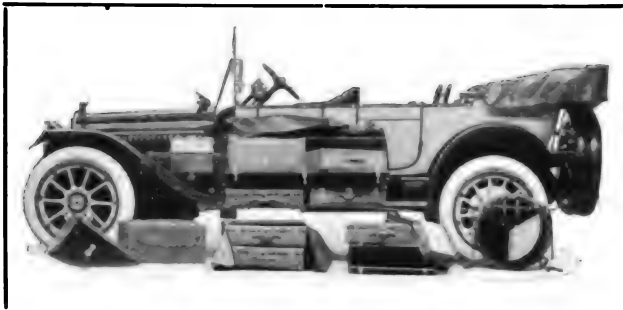
Goggles for Every Purpose.

Sun glare, dust and eye strain, due to constant watching the right of way, are factors that militate against the complete enjoyment of the motor trip. However, these are largely overcome by the use of goggles, and none are more efficient than those produced by the New Era Optical Company, 123 West Madison street, Chicago, Ill.



Adjusting the Auto-Comfort Robe.

These goggles are excellently made and are equipped with the best of lenses. The New Era company makes a wide variety of scientifically colored lenses, designed particularly to minimize the sun's rays and to eliminate



Kamlee Packard Touring Outfit.

the glare from sandy roads. Their use affords a cooling sensation to the driver, relieving in large measure the strain to which his eyes are subjected while touring long distances.

Handy Electric Lamp Case.

Next to the necessity for spare electric lamps, is the necessity for a safe and convenient means of carrying them. The case illustrated herewith is made by the Dover Stamping and Manufacturing Company, Cambridge, Mass., and is designed especially for the purposes of the touring motorists.



Dover Electric Lamp Case.

The case is made of heavy sheet steel without seams and measures $5\frac{1}{2} \times 3\frac{1}{4} \times 3\frac{1}{4}$ inches. It has capacity for two headlight lamps, two side light lamps, one tail light lamp and one speedometer. These are securely held by brace springs and a new locking device. It is handsomely finished and has an automatic spring catch. The case is sold at retail for 75 cents, and can be purchased either direct from the company or from most any dealer.

Duplex Automobile Pail.

A water bucket fitted with a splash guard, strainer and spout should appeal to the careful motor tourist. The strainer is designed to make it possible for the motorist to clear the water, as it is poured, of any foreign matter that may lodge in the radiator; or it will clarify it sufficiently for drinking purposes.



Duplex Folding Pail.

The Planet Company, Westfield, Mass., manufactures the Duplex folding pail illustrated and having all the features mentioned above. It is very serviceable, being made of heavy water proofed, brown canvas, and having supporting metal parts of spring steel that are warranted to be rust proof.

Being foldable, the pail can be stored away in very small places about the car. It is made in six-quart and 10-quart sizes and sells retail at \$1.50 and \$2 respectively.

Nokorode Solderkit.

Experienced motor tourists generally recognize that one of the most important units of their equipment for a trip through the country is a soldering kit. Frequently its lack has not only proven an inconvenience, but a direct means of adding materially to the cost of maintenance by forcing the motorist to call upon some way-side repairman for help.



The soldering kit illustrated, the product of the M. W. Dutton

Nokorode Solderkit.

Company, 150 Niagara street, Providence, R. I., is a complete outfit that will be found extremely serviceable and convenient. For the novice, each kit contains a complete instruction sheet on soldering, which so thoroughly illustrates 19 different repairs that any one can easily perform them.

The outfit is packed in a neat basswood case, fitted with a sliding cover, and can be carried conveniently in the tool box of the car. It consists of a properly tinned soldering iron, two strips of emery cloth, a roll of friction tape and a can of Nokorode soldering paste, which is used widely, especially among manufacturers of automobiles.

The retail price of the complete kit is extremely moderate, \$1, and it is sold with the guarantee that if satisfaction is not derived, the full purchase price will be promptly refunded. Mention of this publication when writing will bring prompt response from the manufacturer.

The Hickey Condenser.

The Hickey Condenser Company, 22 Battery street, San Francisco, is producing a steam condenser for use on water cooled automobiles and is the sole manufacturer of any article of this type. The condenser is neatly designed and made of brass, heavily nickel plated. It is an ornamental attachment to the car.

The condenser fits the radiator in the place of the filler cap. It is constructed so that cool air passes through the funnel, and then into the condensing chamber and around the condensing coil, from whence it flows into the radiator and out through the overflow pipe. This action condenses the steam and returns the water to the radiator, so that there is no loss.

This device also tends to minimize the temperature of the water. The attachment readily fits any Ford car and can be installed on any other make in a very short time, complete instructions being furnished.

The retail price of the Hickey condenser is \$5 and is sold with the guarantee that if satisfaction is not given in 30 days it may be returned and the full purchase price refunded.



Hickey Condenser.

Commissary Outfits for Tourists.

There comes a time during the tour when a commissary outfit is an absolute necessity. Even when hotels or eating places are convenient to the touring party when the meal hour arrives, there are a large number who would relish their food much more if they could conjure up a meal *à fresco*, to be eaten under a shady tree on the roadside.

The outfit illustrated is made by the **Pratt & Whitney Manufacturing Company**, Grand Rapids, Wis., and is only one of the several they produce especially for the tourist. They bear the significant title of "Auto Kitchenettes." The outfits include all the necessary utensils for preparing and serving a meal, from a stove to dishes and silver ware. They are comparatively light in weight and can be carried conveniently on the running board. The gasoline stove gives a very hot flame, which is wind proof and free from explosion possibilities.

The largest size outfit is that designed for six persons, consisting of a No. 1 Moat folding gasoline stove, fitted with two regulation burners and an oven 10 by 13½ by eight inches. Also included are two stew and two frying pans, one bake dish, one 12-inch platter, six dinner plates, cups, knives, forks, spoons, a butcher and kitchen knife, two-quart coffee pot, one flour or bread box, coffee and sugar canisters and salt and pepper shakers.

The case in which the utensils are carried measures 17½x28x12 inches, and the weight is 75 pounds. The complete outfit retails at \$37.50. An outfit designed for four persons sells at \$26, while the de luxe outfit, composed of aluminum, 12 cwt. silver plate and white enamel, retails for \$50. A two-party outfit is also made.

Self-Acting Radiator Cement.

A compound prepared for the purposes of stopping quickly radiator leaks that may develop on a touring trip and saving the motorist much loss of time in an emergency is offered by Northwestern Chemical Company, Marietta, O. This is a self-acting radiator cement, which is poured into the radiator with the water in which it dissolves.

It circulates to the leak and is there congealed into a hard substance the instant it strikes the air. This plugs the leak effectively. The excess fluid should be flushed from the cooling space with fresh water at once, and the repair is then complete and permanent. To solder a radiator properly requires that it be taken from the frame. That makes necessary a trip to a repair shop and a long and rather expensive job.

Se-ment-ol, as this product is called, is sold in large cans for 75 cents each retail. It may be had from most dealers or from the maker direct. Literature concerning it will be sent to those mentioning this publication when they write.

The other products of the company include a carbon remover (Carbonox), an air drying enamel (Brass-Kote), an anti-freeze (Thermite), an engine enamel (Never-Burn), a rim paint (Never-Rust), a tire paint (Tire-Lac), a gear quieting lubricant (Gear-Silence).

Fire Extinguishers.

Subconsciously perhaps every touring motorist is apprehensive of fire and its disastrous results. This fire factor is recognized by auto insurance companies, and they make their rates accordingly, unless an adequate means of protection is provided on the car. The National Board of Fire Underwriters has investigated the fire extinguishers on the market. In the case of the Pyrene Fire Extinguisher, sold by the Pyrene Fire Extinguisher Company of New England, 88 Broad street, Boston, Mass., it approved the device because of its efficiency and consequently motorists providing such equipment for their cars can obtain insurance at a 15 per cent. reduction over the ordinary rates of cars without such protection.

In addition to providing the motorist with a safeguard, the extinguisher can be satisfactorily used in quenching flames in the home, the garage or any other place where fire may spring up. Standard equipment for the Pyrene is one quart capacity, contained in the brass and nickel container illustrated. It is light in weight and occupies but little space in a car, and it is always ready for service.

These extinguishers can be obtained from almost any dealer in the country, even in the remote communities, or a letter addressed to the company and mentioning this publication will elicit information where they can be obtained with the least delay.

Baseline Autoline for Tourists.

A good strong rope is the only salvation of the driver who gets his car stalled in deep sand or mud. One end can be attached to a pole and the other wound round the rear wheel hub until the car pulls itself out. In case of break down such a rope is often a necessity in getting the car to the repair shop.

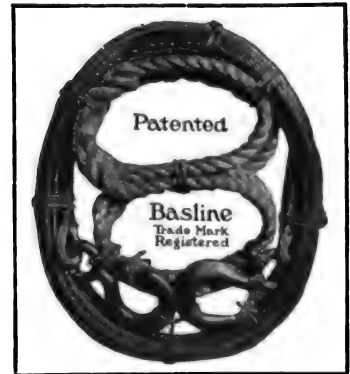
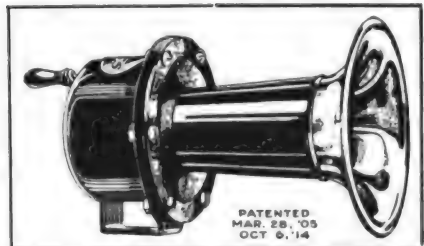
To fill both these needs the Broderick & Bascom Rope Company, St. Louis, Mo., is manufacturing specially constructed steel ropes designed for autoists. They are made of yellow strand power steel wire closely woven into a quarter-inch rope. This is the same material that is used in the well known hoist ropes which the company produces. At each end is a steel hook.

Rapid attachment to the car is made possible by two half-inch manila rope slings, which are furnished with each line. The retail price, including the two slings, is \$3.95.

Warning Signals.

While a warning signal may not be in such constant use in touring the rural highways as in the more congested city thoroughfares, nevertheless, when they are required it is imperative that they are able to respond instantly.

One of the most efficient, as well as long-lived, is the mechanical horn produced by the Seiss Manufacturing Company, Toledo, O. It has qualities possessed by no other make, and one of its features is that it is double-acting, that is, it may be operated manually by turning the handle in either direction. Being hand operated, the

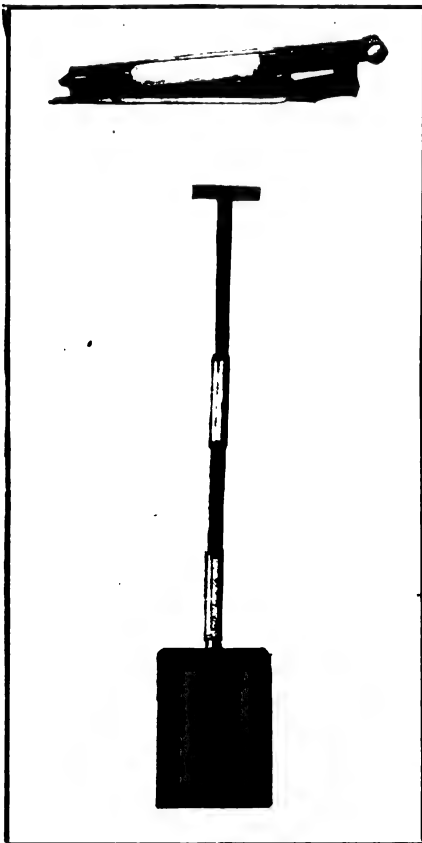
**The Pyrene Fire Extinguisher.****Baseline Autoline Coiled for Storing.****Seiss Model A Mechanical Horn.****Se-ment-ol for Leaky Radiators.**

tone can be modulated or intensified to suit the conditions.

A factor that will appeal to tourists far from repair shops is that it has no springs to get out of order, and only three bearings. The sounding diaphragm is made of vanadium steel and the gears are machine cut and very accurate. Endurance of the contact point and the toothed wheel is insured by being heat treated. The horn is guaranteed for 10 years and the model A retails at \$4.

Dudley Folding Shovel.

A shovel is one of the handiest units of the tourist's equipment, especially on unimproved roads. Some motorists, however, prefer to omit this essential on account



The Dudley Shovel Folded and Extended.

passing over them.

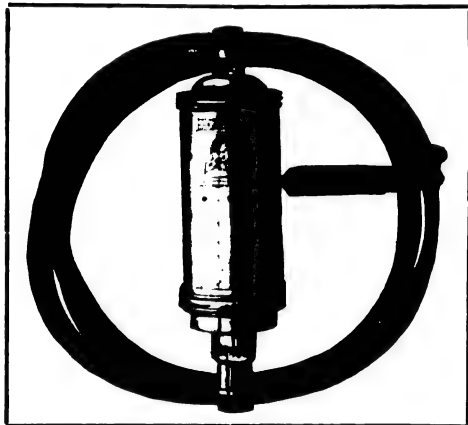
A feature of this device is that the blade is flat. This construction increases its range of work. Should it be necessary to change a tire, on a sandy or muddy road, the shovel can first be used to remove the loose gravel below the axle and then the blade placed under the jack, thereby affording a solid base for the latter. The handle may be turned aside so that the jack may be conveniently operated. This device retails at \$3.

Automatically Controlled Pumps.

Nothing is more distasteful to the touring motorist than to have to pump up his tires with an ordinary hand pump, and for that reason the motor driven pumps on the market find ready sale and are welcomed by the average car owner.

A motor driven tire pump that is automatically controlled to predetermined pressures, is made by the Hill Valve Pump Company, 18-20 Kinzie street, Chicago, Ill. This device, known as the Utility Tire Pump and Pneu-Meter, consists of two units, one being a spark plug pump and the other a controller that automatically closes the tire valve when the required amount of air has entered the tires, and also warns the motorist by emitting a shrill, hissing sound. The pump is easily attached and is provided with a flexible air tube that has been tested to a 1500-pound pressure before

leaving the factory. In operation, the Pneu-Meter, which is located at the valve, turns off the supply of air to the tire and forces it through an opening, where it assumes a loud whistling sound that can be heard at a comparatively long distance. This device can be adjusted to pressures ranging from 50 to 125 pounds. The adjustment is simple, and is accomplished by revolving its outer sleeve until the numbers thereon show the number of pounds required for certain sizes of tires. A table on the Pneu-Meter gives these pressures, which is a decided convenience to any motorist, the tables being accurate and the results of long experience in tire inflation. The complete device, including the Pneu-Meter, is sold for \$10 each, and is adaptable to any car. There is a smaller size, designated as the Utility Junior, which is intended for cars having smaller sized tires, and it is retailed at \$6 for the complete equipment. The Pneu-Meter can be bought separately, at \$2 each.



Utility Pump, Complete with Whistling Pneu-Meter.

Another Hill company product of merit is the Utility socket wrench set, possessing all the advantages of 14 wrenches, with none of their faults. It will take all nuts used in auto work without mutilation. In removing nuts the jaws hold firmly all the time.

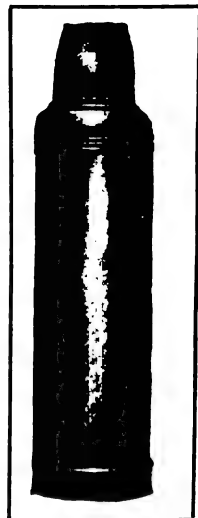
Simplex Vacuum Bottles.

Nothing is more essential to the enjoyment of a roadside meal than some provision for keeping hot drinks, hot, and cold drinks, cold. A wide variety of vacuum bottles designed for this purpose is marketed by the Simplex Vacuum Manufacturing Company, 1729 North Phillip street, Philadelphia.

The container consists of two bottles, one within the other, and a space between the two. The air is expelled from the intervening space, producing practically a complete vacuum, so that heat or cold are transmitted very slowly to the contents of the bottle. A hot liquid placed in this retainer will remain hot for 30 hours, and a cold one will stay cold for 80 hours. The inner bottle may be removed from its case to be washed and sterilized.

The illustration shows a type that is listed in the company's catalogue as No. 406. All the metal used in its construction is heavy nickel-brass, and the case is seamless. It has a capacity of one pint and sells at retail for \$1.50.

Many other types of vacuum bottles and lunch kits, some of which have been designed especially for motorists, are offered by the same maker. Among these are "motor restaurants" for from two to six people, containing in a compact case knives, forks, spoons, cups and boxes for food. These are useful in enabling the tourist to pack all equipment for a wayside meal into the smallest possible space. Wicker, metal and leatherette exterior cases are used on different types of bottles and carafes, giving them a handsome exterior appearance. Full information regarding the Simplex lunch equipment may be had by those who write the manufacturer.



Simplex No. 406 Vacuum Bottle.

Whitall Tatum Auto Bucket.

A collapsible water bucket will be found to be a decidedly beneficial adjunct to the tourist's equipment, especially the bucket manufactured by the Whitall Tatum Company, 46-48 Barclay street, New York City, and illustrated herewith. It is made for service, having a reinforced centre to withstand heavy strains, double corners and bottom to prevent leaks from punctures, etc., and extra strong handles, securely fastened, that will not pull out.

The company uses only the best quality of maroon rubber, cloth lined in its manufacture.

Whitall Tatum Auto Bucket.

It is simple in construction and has no braces or mechanism to get out of order, and nothing to cause wear in spots, nor is a spout or funnel required, for the bucket is shaped to pour cleanly.

The capacity is 1½ gallons, and it retails at \$1.25.

Gloves for Tourists.

An important item in the tourist's equipment is a suitable pair of gloves to protect the hands and keep them clean. One of the many types of motoring gloves, style V 4020, made by the Morrison-Ricker Manufacturing Company, Grinnell, Ia., is shown in the illustration. They may be had either with or without perforations in the backs for purposes of ventilation.

The perforated back permits air to circulate through the glove and keeps the hand cool and dry. A "rist fit" closing feature prevents the cuff from sagging over the hand and insures a snug fit at the wrist. The materials used are reindeer hide, black or drab coltskin and black cape. Prices range from \$2 to \$4.

One of the most recent styles produced by the company is the "Limp-Kuff," No. 4446. It has a soft cuff, which can be easily crumpled and folded and carried conveniently in the pocket. This type, also, may be had

**A New Style of Grinnell Gloves.**

with or without the ventilating feature. An adjustable strap fastener insures a close fit at the wrist. The "Limp-Kuff" is made from black or drab coltskin, or black Turkish cape, and ranges in price from \$2 to \$3.50.

Protecting the Clothes.

The motor tourist who expects to dine and sleep in hotels during the trip should have adequate protection for his clothes, especially while he is working around

**Shanhouse Motorsuit.**

the car and liable to come in contact with grease or mud. As every one knows, grease spots are difficult, and sometimes impossible, to remove, which entails the cost of a new suit through not having had adequate protection.

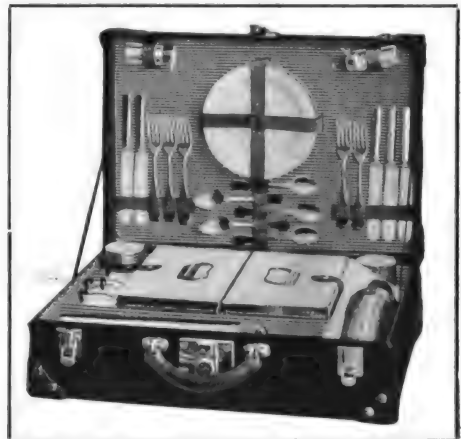
Complete protection is afforded in such cases by the motorsuit illustrated herewith. It is the product of the Shanhouse Company, Rockford, Ill., and is a one-piece garment that may be folded and carried in the car conveniently, it requiring but little space. It can be slipped on almost as quickly as a duster, and gives even greater protection. It is made of khaki and is dust and grease proof. In ordering the suit, the measurements of the chest and length of the leg should be specified.

Warren Motor Restaurant.

A tidy black enamelled box, resembling a suit case, but containing cutlery, cups, spoons and plates for serving an outdoor meal to five people, is produced by the

Warren Leather Goods Company, Worcester, Mass. It may be had also in sizes for various numbers of people from two up.

It consists of a wood box covered with black enamelled duck, which is durable and water proof. The interior is lined with black and white striped enamelled cloth. Arrangements are made for fastening five plates, spoons, knives and forks and salt and pepper shakers in the cover. The body carries two food boxes, two glass jars and has space for two vacuum bottles, which are not supplied, and five cups. The dimensions of the case are 19½ inches long, 14 inches in width and six inches deep.

**Warren Motor Restaurant.**

It consists of a wood box covered with black enamelled duck, which is durable and water proof. The interior is lined with black and white striped enamelled cloth. Arrangements are made for fastening five plates, spoons, knives and forks and salt and pepper shakers in the cover. The body carries two food boxes, two glass jars and has space for two vacuum bottles, which are not supplied, and five cups. The dimensions of the case are 19½ inches long, 14 inches in width and six inches deep.

TENTING BY THE ROADSIDE.

THERE are stretches in the West on some of the transcontinental roads where towns are so far apart that it is often more convenient to car-



The "All-In-One" In Use as a Double Sleeping Bag.

ry a tent and camp for the night than to make a forced run to the next place where accommodations can be had. In other parts of the country there are many delightful spots by the creeks, lakes and rivers, where many motorists would prefer to stay rather than run into a city for a night at a hotel.

Modern equipment makes it possible to carry in a car of ordinary size everything that is necessary to set up a most comfortable camp for the night wherever the motorist may wish to stay. A great many who have enjoyed roughing it in the past will this year combine a tour and camping expedition by stopping every night in the open.

Complete equipment may now be had for such an expedition that can be packed in a surprisingly small space. It will seldom be necessary to carry any great amount of food along, as there are few routes upon which the motorist will not pass through some town at least once a day, where fresh supplies can be had.

Thermos bottles for the preservation of drinks and "motor restaurants" containing cups, spoons, forks, knives, plates and all eating utensils neces-

sary for from two to six people are on the market. The entire outfit is packed neatly in a small case for which room can easily be found in the car.

The cooking utensils necessary will be a frying pan, a tea kettle, tea or coffee pot, and one or two small auxiliary pans or pails.

Some very cleverly designed combined tents, sleeping bags and ponchos, which should add greatly to the motorist's comfort on such a trip, are available. One of these is produced by the Warner Top Company, 1646 Central avenue, Cincinnati, O., and is known as the "All in One." It can be used as a sleeping tent, sleeping bag, dining tent, poncho or hooded-ground-cover, and yet it weighs only 10 pounds.

Its equipment includes all the ropes, stakes, folding poles and snap buttons that are required to adapt it to its various uses. As a poncho it has the great advantage of buttoning closely around the neck, completely closing the slit through which the head is thrust and which in many old style ponchos was left open to such an extent that rain or snow would drench the shoulders. When not used as a poncho the neck opening is completely closed by means of flaps and snap buttons, preventing the water from entering.

Folding poles of the type used by the United States army are provided for stretching the "All in One" as a sleeping tent. Stakes for fastening it securely to the ground are also provided. If there are two in the party and both have ponchos, the second one can be placed on the ground under the tent and the two round corners are hooded by means of a draw rope. The foot end is folded up and buttoned at the sides to protect the feet and prevent its being kicked down.



Preparing the Meal at the End of the Day's Trip—The "All-In-One" Being Used as a Tent, Supplies Being Stored in End Under Ventilators.

It is then possible to lay the two blankets one over the other and crawl in as in a bed, or each person may roll up in his own blanket. Two long ropes attached one to each poncho can be tied loosely over the sleepers, holding up the sides and protecting the occupants from wind, water, snakes and bugs.

If there are two ponchos in the party, these can be pitched side by side as sleeping tents. These tents can be rapidly converted into a single large dining tent by raising the two sides and bracing them up with long poles, leaving the short, folding poles in place as they were before.

To use two ponchos as a ground and over cover one is spread on the ground and the corners puckered with ropes, as previously described, while the other is laid over the top and staked down about the sides. The blankets are placed inside and two sleepers are snugly placed for the night. The top flap can be folded down in mild weather or used to cover the face when it is cold.

When used as a sleeping bag for one person the cover is laid flat on the ground. The blanket is laid flat on top of it. One round corner is pulled up into a hood by means of the rope provided. The lower end is folded back and buttoned, leaving several buttons open to put the feet through. One side is then thrown over the body and tucked in. The occupant rolls over once and he is completely enclosed in a warm and water tight bag. A flap will cover the face or leave it exposed, as may be desired.

Great care has been used in selecting the material for this useful item of camping equipment. The fabric is the best eight-ounce United States army duck, double filled and rubberized by a new process, which makes it durable and entirely water proof.

One of the first requisites for a pleasant night in the open is good judgment in selecting the roadside camp site. There should be, nearby, a good supply of clear water and fuel for the camp

fire should be convenient and plentiful.

The site should be high and dry and level enough for the tent and camp fire and of such a



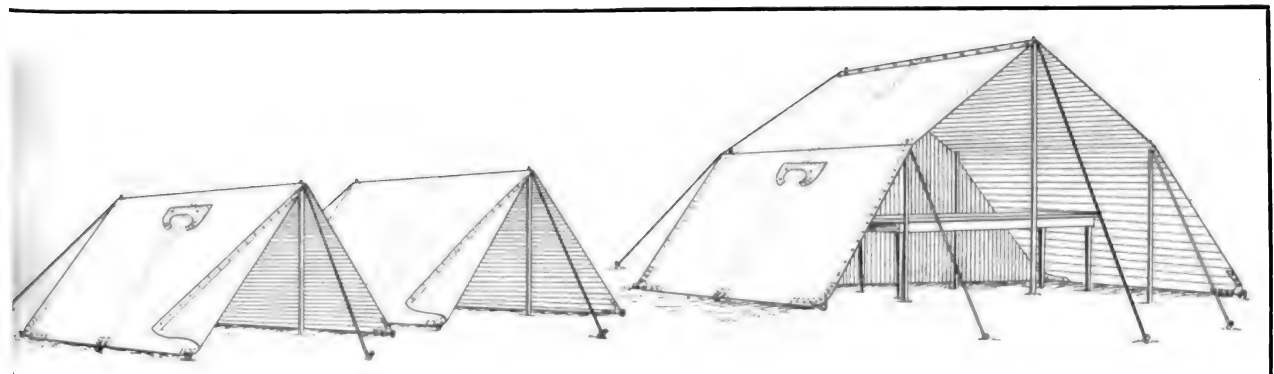
Diagram illustrating How "All-In-One" Is Folded and Puckered to Form Sleeping Bag.

nature that in the case of a heavy rain there are no hollows that might fill up with water. It is best not to select a site that has been recently used as a camp, as there is likely to be little fuel about and the ground may not be clean.

The first step is to clear away any obstruction and then proceed to set up the tent, build the fire and cook. If there are several persons in the party this work can be divided between them and should be accomplished in a little while without too much effort.

One of the best ways to make a camp fire is to pile up the wood against a large log, or still better, between two logs. Large sticks or boughs can be laid across the log in such a way as to afford support for cooking utensils immediately above the fire.

Forked sticks may be placed across the log so that the fork will hold the cooking utensil in the right place and the lower ends may be weighted with stones to keep them in place. Another plan is to drive a forked stick a little distance from either end of the fire and lay a pole in the crotches so that it passes over the fire between them. On this pole the cooking utensils may be hung. Bent wires make excellent hangers on which to swing the cooking utensils.



Two "All-In-One" Tents Used Singly and How They Can Be Combined to Form Large Dining Tent.

N. A. C. C. MEMBERS POOL PATENTS.

MEMBERS of the National Automobile Chamber of Commerce have adopted an agreement, by which each manufacturer will grant all others who accept the plan, free licenses to use the patents he controls.

This is one of the most far reaching steps in co-operative competition that has ever been taken in any industry. It is expected to eliminate by far the larger part of the patent litigation which has in the past proved expensive and troublesome, without accomplishing much good for anybody.

When the agreement was drawn up for submission to the members it was provided that it should not become operative until 63 members controlling 300 patents had signed. This meant that any member who signed would receive in return for licenses under his patents—ranging from four or five up—rights to at least 300 devices controlled by other manufacturers.

This feature made the adoption of the agreement possible, for each member received rights of far more value than those he gave. While many hold their patents to be very valuable, all were expected to feel that the combined patents held by the rest of the industry are of greater value.

There are 93 members of the chamber and of these 69 have signed the agreement to date and have secured the sanction of their boards of directors. A number of others have signed and are still awaiting the action of their boards.

Careful study has been given the agreement by eminent lawyers employed by many members of the chamber, and it has been found to be drawn in satisfactory terms. The leaders of the movement are confident that after a list of the patents involved is drawn up and made known practically every member will participate.

The patent committee whose efforts have brought about this unprecedented step consists of C. C. Hanch (Studebaker), W. H. Van Dervoort (Moline), Windsor T. White (White), Wilfred C. Leland (Cadillac) and Howard E. Coffin (Hudson).

The agreement covers all patents held by the members, with the exception of design patents and certain patents on trucks, tractors, fire apparatus and ambulances, and with the further exception of basic patents of a revolutionary nature that may in the future be developed within the organization of any member.

While there are many patents on very important features of construction held by various members of the chamber, it has been found that most of the litigation and trouble has resulted from those covering minor features. These have been used by competitors to harass each other.

The agreement will put manufacturers in a position to take their minds off of patent difficulties and to devote themselves to competition among themselves by means of improved manufacturing, selling and advertising methods. Incidentally, it greatly improves their position as against foreign manufacturers in the battle for export trade and gives them many advantages over manufacturers that are not parties to the agreement.

In a brief of the reasons in favor of the adoption of the cross licensing plan issued by the chamber, the following points are included: It is to the interests of the members of the industry to remove the possibility of expensive patent litigation between them. No matter how many patents any individual member may own they cannot be of as great value as all the other patents held in the industry. The agreement will cement the industry together in a co-operative spirit that is in keeping with the tendency of the times. There has been very little money made out of patents in the automobile industry, and not much can be made by litigating them, as the winner of a patent suit seldom gains much.

Legitimate profit should come from the manufacture and selling of cars and not from the exploitation of patents which are incidental to development of the car and are generally originated by individual engineers, whether they take out patents or not. The main object of every manufacturer is to establish a substantial business, paying no attention to patents except to guard against patent litigation. Each member is left free to display his originality along the line of design patents. No attempt has been made to include patents on rapidly developing products such as loading and unloading devices, fire apparatus and tractors. Provision is made to exempt for special consideration any basic or revolutionary patent of great value that may hereafter be developed, thus encouraging further advance in the art of motor car building.

Twenty per cent. of the automobiles in Japan are Studebakers.

TAKES A BOAT WITH MOTORCYCLE.

ON HIS numerous fishing trips, B. A. Swenson of Providence, R. I., hauls behind his Indian motorcycle, on a specially constructed trailer, a light dory, equipped with a detachable gasoline motor. He takes his family with him, too. His wife rides in the side car and his little daughter is comfortably ensconced on cushions in the boat.

This motorcyclist is an enthusiastic angler; he would much rather fish than eat. Several times last season when he started out for a day of his favorite sport he found it impossible to get a boat when he arrived where fish were. Or he was forced to resurrect a water logged, flat bottom scow and devote most of his attention to bailing it out instead of to fishing.

He attached two regulation motorcycle wheels to an axle. Upon these he built a light frame equipped with shock absorbers and a cradle in which a skiff could be carried. During the winter he had a light skiff built from his own plans. The craft is 12 feet long and nearly four feet wide, providing ample room to carry the whole family.

It is equipped with a detachable gasoline motor which has sufficient power to send it through the water at 12 miles an hour. It weighs only about 100 pounds. He found that his motorcycle had power enough to pull the whole outfit through deep sand and that on a smooth stretch of state highway it would make 50 miles an hour, which is considerably faster than he ever wants to go.

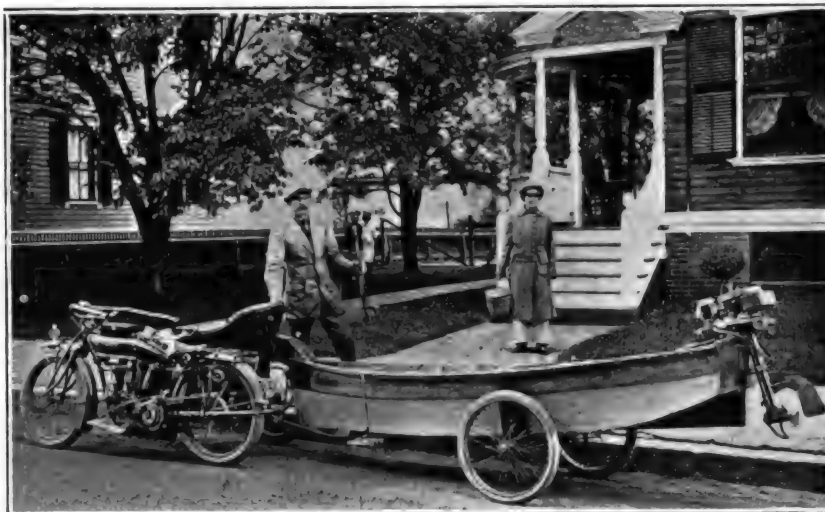
THE BOSCH NEWS.

The June number of the Bosch News, a small sized magazine, now in its sixth volume, and published by the Bosch Magneto Company, is an especially interesting issue. The notable features of this number are "America's Largest Gas Engine Using Magneto Ignition," "The Two Millionth Bosch Magneto Has Been Made and Sold," "Bosch Electric Starting Systems" and "Prominent Racing Drivers Express Gratitude."

There is a very interesting tabulation of racing events and records covering the past two years. The book is profusely illustrated with timely photographs.

AUTOMOBILE ROAD MAPS.

The Gulf Refining Company, Pittsburg, Penn., is distributing free upon request a series of folder road maps, pocket size, covering New England, New Jersey, Pennsylvania, the southern states, the middle west, New York state and the transcontinental routes. They are accurate, legible and are printed in colors with illuminated borders. Motorists will find them valuable literature to possess, and can obtain them from the



Rhode Islander Mounts Motor Driven Boat on Trailer and Draws It and Family on Outings with Indian Motorcycle.

company or from any dealer selling Gulf Refining Company products.

"WHY AN EIGHT."

Gratified by the great interest exhibited in its booklet entitled "Quizzes and Answers," the Cole Motor Car Company, Indianapolis, has recently published its successor, "Why an Eight." It is a practical discussion, in the argot of the layman, of the eight-cylinder motor, and is amply illustrated to give additional weight to the arguments.

Vermont registrations to June 1 amounted to 9999, which is 2720 more than on June 1 last year. The state has 132 dealers and 499 motorcycles.

RESTA SETS NEW WORLD'S RECORD.

Crack Peugeot Driver Averages 97.58 Miles Per Hour for 500 Miles in the Fastest Race Ever Run, at the Opening of New Chicago Speedway.

THERE were plenty of surprises in the first 500-mile race run on the new two-mile board speedway at Chicago. The first and greatest was the speed, 97.58 miles per hour, by Resta, the first man to finish, and 90.3 by J. Cooper, the 10th to finish.

Though at Indianapolis, De Palma had broken by more than seven miles per hour the previous American speedway record, every man who took a prize at Chicago made better time than the winner's Memorial Day performance. The race was the fastest that had ever been run on any track.

Another surprise was the lack of mechanical trouble suffered by the cars. A smaller proportion than ever before were forced to leave the race through failure of the mechanism. Many of the leaders had no mechanical trouble, and one car, Harry Grant's six-cylinder Sunbeam, made the entire distance without a stop. This is a new non-stop record.

Had Resta been pushed the time might have been very close to 100 miles per hour, as for an hour, when it was necessary, he averaged 99.4 miles. He began with the idea that 97 miles per hour would be plenty fast enough to win. He stuck to a pace a little slower than that at first in spite of efforts of the Stutz team to tempt him to a speed that might have put his car out. Finding his pace too slow at the end of about an hour he set his mark at 100 miles per hour for the second 100 miles and nearly made it. This gave him the lead and he never lost it, although he slackened up toward the end.

Porporato Unaware of Speed.

The cars circled the track so rapidly that the somewhat inexperienced scorers could not keep up with them. Porporato, who came in second with an average of 96.5 miles per hour, did not know his relative position and believed himself distanced. He was much astonished to learn that he had been in the leading position at 100 miles and had won \$1000. He did not believe that his car would finish among the prize winners, and

the \$11,000 he won was a pleasant surprise.

Tire trouble caused an unusual number of stops, changes on the right rear wheel being necessary at short intervals, when the cars were running around 100 miles per hour. Late in the race this was partly overcome by the drivers picking a path further up on the track, which seemed to be easier on the tires.

Porporato, the Italian Sunbeam driver, ran a splendid race. It was his fast pace that made possible a speed of 99.2 miles per hour for the first 100 miles. His motor smoked throughout the 500 miles and the smoke blowing in his face made it necessary for him to breathe only in long draughts at about half-mile intervals, when he leaned far out over the side of the car to get fresh air.

After the showing made at Indianapolis it was thought that the Stutz team would be a big factor

in the race. These cars seemed to eat up tires on the board track much faster than the others and many more stops were necessary. Their speed, during the time they were actually on the track, was

RESULTS.

Driver	Car	M. P. H.	Prizes
Resta.....	Peugeot	97.58	\$23,000
Porporato.....	Sunbeam	96.5	11,000
Rickenbacher.....	Maxwell	96.1	5,000
E. Cooper.....	Stutz	94.9	3,500
Grant.....	Sunbeam	94.3	3,000
Anderson.....	Stutz	93.7	2,000
Chevrolet.....	Delage	92.8	1,800
Burman.....	Peugeot	92.2	1,700
Alley.....	Duesenberg	91.3	1,600
J. Cooper.....	Sebring	90.3	1,400

equal to the winner's. Cooper finished fourth at 94.9 miles per hour, and Anderson sixth at 93.7. Wilcox had to withdraw with a broken piston.

Rickenbacher, who won third place, had not shown very well at Indianapolis owing to incessant spark plug trouble. That had been eliminated and after running 10th or 11th during the early stages he came up rapidly toward the front. Cooper was very consistent, only once falling behind fourth place.

Grant's Sunbeam had developed so many minor troubles at Indianapolis that it had to be withdrawn. In this race he picked a pace that he thought his car could stand and stuck to it without reference to what any one else did. He made a two-mile lap every minute and 15 seconds with almost mechanical regularity all through.

Burman and his mechanics gave a remarkable

exhibition of quick and accurate work before the race started. The cars were just about to line up when he found he had a seized piston. He asked the officials for time to fix up the difficulty and they gave him half an hour. In that time the engine was dismantled, the cylinder cleaned and a new piston mounted. The car came to the line in such good condition that he was able to finish eighth at a speed of 92.2 miles per hour.

There was far less mechanical trouble, on the whole, than had been experienced at Indianapolis. The drivers had employed their time to good advantage in getting out of their cars the shortcomings that had developed there. The board track was smoother than bricks and some of the cars from which important parts had been shaken loose in the earlier race came through without trouble.

The track showed itself to be the fastest in the world. There was nothing approaching an accident throughout the day and there is every reason to believe that if cars and tires could stand a much faster pace it could be safely made on the track.

To the spectators it seemed that there were many more tire changes than at Indianapolis, but statistics kept by the tire men showed that was so only because most of the changes had to be made on the right rear wheel.

Twelve cars which finished the race put on 41 new tires as against 44 on 11 cars at Indianapolis. A tire change was made on an average every 146 miles, as against a change every 100 miles at Indianapolis. In addition to Grant the following drivers did not change tires: Alley in a Duesenberg, Babcock in a Peugeot and Cooper in a Sebring. Every car entered was equipped with Goodrich Silvertown Cord tires.

RICKENBACHER WINS TWO MORE.

Eddie Rickenbacher, driver of the Maxwell, which was the first American car to finish at Chicago, won both the Sioux City and Omaha races on July 3 and 5 respectively. The race at Sioux City, July 3, was over a two-mile dirt track and Rickenbacher's time there was 74.70 miles per hour. At Omaha over the new two-mile board speedway he made 91.07 miles per hour, again beating the record made by De Palma at Indianapolis.

Both races were for 300 miles and Rickenbacher's purse in each case was \$6500. At Sioux City he was followed across the line by Eddie O'Donnell in a Duesenberg, who was a little more than two minutes behind him, with Tom Alley in another Duesenberg third, and nine minutes behind O'Donnell.

Dario Resta, who was a strong favorite for the race because of his previous performances, showed up badly at the start. He broke an oil line on the back stretch and withdrew his car, declaring that it would be impossible to get it in shape for the Omaha race, in which he also was entered.

Rickenbacher took the lead early in the race, with O'Donnell and Alley following, and those same positions were maintained until the end of the race. In the 60-mile race the Ogren special, driven by C. C. Cox, struck a rut and turned completely over, breaking Cox's shoulder and the leg of his mechanic, McGraw. Both will recover.



Rickenbacher and the Winning Maxwell.

At Omaha on the board track this race was almost duplicated, with Rickenbacher first, O'Donnell second and Tom Orr, another Maxwell pilot, third. H. Donaldson was fourth. Rickenbacher again kept ahead of the field throughout the entire race.

Although 18 drivers were entered, only seven arrived from Sioux City in time to start. Before the 300-mile race Tom Orr broke the world's record for five miles, making it in three minutes flat. The former record was 3.11¾, made by Caleb Bragg at Los Angeles.

TIME IS FASTER AT TACOMA.

In two days of racing on the newly planked two-mile speedway at Tacoma, rates of speed about 11 miles faster than those made last year resulted from the improved surface of the track. Ruckstell, in a Mercer, won the 250-mile Montamarathon at a rate of 84.8 miles. Pullen, in another Mercer, took the 200-mile event at 85.2

miles per hour, and Parsons, in a Parsons special, won the 100-mile Intercity race at 80 miles per hour.

Carlson's Maxwell blew out a tire on the sixth lap and was thrown over a 30-foot embankment on a curve. Franzen, his mechanic, landed on his back on a stump and was instantly killed. Carlson was taken to a hospital with a crushed head and internal injuries and died without recovering consciousness.

Cooper was second in the 250-mile event, with an average of 84.22 miles, and Pullen's Mercer finished just behind at a speed of 84.20 miles. Burman's Peugeot was fourth at 79.5 miles per hour, and Oldfield, in another Peugeot, fifth, at 75.8 miles per hour. Cooper made one lap at 89 miles per hour, the fastest in the race.

Thirteen cars started, but only the five that took prizes finished. The total prizes for this

event were \$5500. Ruckstell took the lead early and held it for most of the race, although at the finish the prize winners were not far apart. Cooper went to the pits for new tires in the 103rd lap and that was his only stop.

The Romano special, fitted with an eight-cylinder aeroplane



"Billy" Carlson, Killed in Tacoma Race.

motor, which had been very successful on the Coast this season, ran well until the 43rd lap, when it took fire and burned. The Gordon special skidded seriously several times and left the track in the 114th lap, although Elliott's good management prevented any injury being done.

In the 200-mile race Cooper was again second with his Stutz, and Oldfield third in his Peugeot. Prizes for this event totalled \$3500.

The Intercity race, run by local drivers, resulted in a speed of 79.5 miles per hour for Parsons, followed by Elliot in a Gordon special, averaging 74.7 miles per hour; Barsby, third, at

63.2 miles per hour; Staley's Studebaker, fourth, at 56.2 miles per hour, and Erdman's Ford, fifth. A Buick, two Mercers and a Malcolm left the track with engine trouble.

CHALMERS WINS HILL CLIMB.

A. E. Walden, in a Chalmers, won the Uniontown, Penn., hill climb event for cars of less than 230 inches piston displacement, covering three miles of mountain road with an average grade of seven per cent. in three minutes and 50 seconds. The prize was \$100. In the free-for-all, C. W. Johnson, head of the Uniontown Automobile Association, won in a Packard, making the three miles in three minutes 27½ seconds, and defeating Ralph De Palma in a Mercedes special. He won \$600. De Palma had a loose magneto and the crowd about the course, nearly 30,000 people, made it necessary for him to stop several times to avoid accident. The hill climb is to be an annual event hereafter.

CHICAGO TO SEATTLE IN 97 HOURS.

A record of 2439 miles in 97 hours was made recently by the cars which relayed from Chicago to Seattle over the Yellowstone trail, otherwise known as the National Parks Highway, carrying a message from Mayor Thompson of Chicago to Mayor Hiram Gill of Seattle.

One of the big objects of the tour was to show that the roads could be covered in less than 100 hours, so demonstrating their quality for touring purposes. In spite of tire trouble, a collision and a broken axle, the time set was bettered.

Each of the relays was about 100 miles long, and a great many makes of cars carried the message, although most of them were light and small. Several Fords, Overlands, Dodge's and other light cars participated and held up their end very well. About three hours was gained in the early part of the run, and was lost by bad roads and accidents in Dakota, but was regained in Montana and held to the Coast.

Checking of the motor cars passing Hammononton, N. J., on the way to and from the Atlantic shore on recent Sundays showed that 18 cars a minute, or between 270 and 290 per hour, were passing over one of the main roads. Many of these came from outside the state. The observation was made in relation to a proposal that the state bear part of the expense of upkeep on the roads.

INTERSTATE CUTS \$150 FROM PRICE.

FOR the 1916 season the Inter-State Motor Company announces that it will continue the cars it has sold during the past year identical

measures 47 inches across and is 21 inches deep. This does not reduce the leg room, as the distance between the back of the front seat and the front of the back seat is 30 inches.



Inter-State Roadster, Showing Centre Location of Seat, High Protecting Sides and Graceful Streamline Design.

The roadster is equally spacious. It is mounted on the same type chassis with the same wheelbase. The seat is located in the centre to obtain easy riding qualities, and the compartment is entered through doors at either side. The sides of the cars are unusually high, affording excellent protection for the passengers from mud or dust.

The instrument board is placed beneath a deep cowl in front of the driver. The front seating compartment is exceptionally large, as will be

in substantially every detail, but the price will be \$850, with complete equipment, a reduction of \$150.

This reduced price is possible from the fact that cars will be produced in greater number the coming year and the policy of the company of concentrating on one chassis has minimized production cost. In the larger market, because of the lower price and with the increase in sales, the company will compensate for a smaller profit a car.

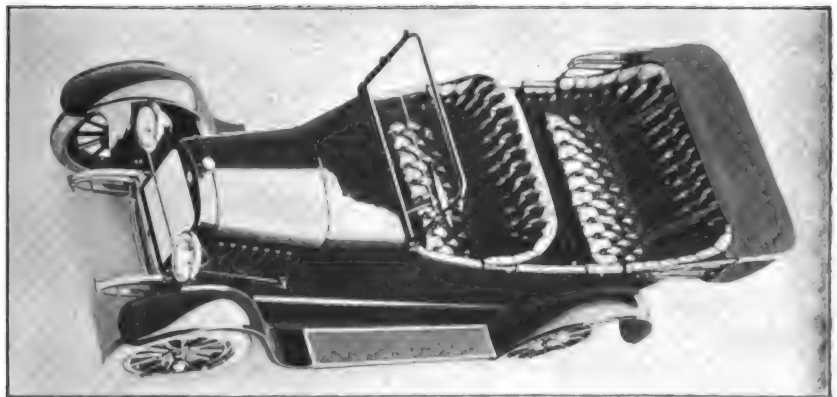
These cars were popular and were sold in large numbers. The machines have as a whole exceptional qualities and they represent a value which, until this year, could not be obtained for anything approaching the price.

Both the touring and roadster bodies have been designed to obtain a conservative streamline effect. The lines of the cowls are blended into those of the bodies with harmonious effect, and the finish and upholstery are exceptionally attractive and sightly.

The exceptionally roomy bodies are mounted on the 110-inch wheelbase chassis. In the touring car the rear seat

noted from the accompanying illustration. At the rear of the roadster seat is a compartment, the cover of which is secured by a latch, in which can be kept the small personal equipment of the owner. The space is large enough to hold the contents of a small steamer trunk and is equally accessible when the top is either raised or lowered. Further back on the rear deck is another compartment in which tires mounted on rims and fully inflated can be carried. They are completely protected from the dust and the weather. Access to this compartment is had through a door which, when closed, forms a part of the rear deck.

The chassis, which is continued unchanged, is unusual for its simplicity of design and the acces-



The Inter-State Touring Model, Showing the Wide and Deep Seats.

sibility of its parts. The valve-in-the-head Beaver motor is a split head construction with the valve rockers actuated in the conventional manner by

chassis frame and is very accessible.

The gearset is a three-speed selective type as a unit with the rear axle. It has nickel steel gears and shafts running on ball and Hyatt roller bearings. The same types of bearings are used in the rear axle, which is a three-quarter floating construction, and has shafts of nickel steel. The drive is through pinion and bevel gears. The axle is the same as that of last year, with a gear reduction of four to one. It is the one-bearing floating type with 12-inch brakes as part of it.

The final drive does not go through the springs, but the torque is taken by a yoke construction. Power is transmitted

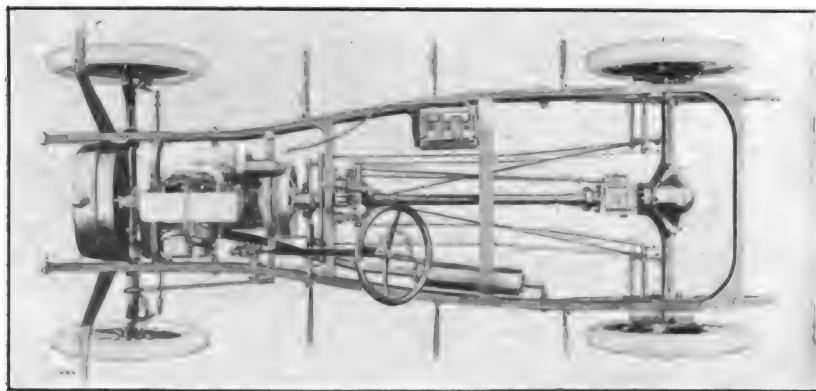
direct to the gear box from the cone clutch through an enclosed propeller shaft.

The rear springs are three-quarter elliptic, underslung on the rear axle. As the drive is not through the rear springs these are shackled at both ends, this affording a very easy spring action.

To shorten the turning radius a bottle-necked frame design has been adopted which makes possible cramping the wheels more sharply. The frame is strongly braced throughout.

A touch which adds materially to the good appearance of the Inter-State models is the exceptionally clean running board and skirts which meet the heavy crown fenders without a break in the even flow of the lines.

The instrument board in the front compartment is metal faced, of handsome appearance, and is within easy reach of the driver. All doors



Inter-State Chassis of Bottle Neck Design, Showing Valve-In-Head Motor and Other Units.

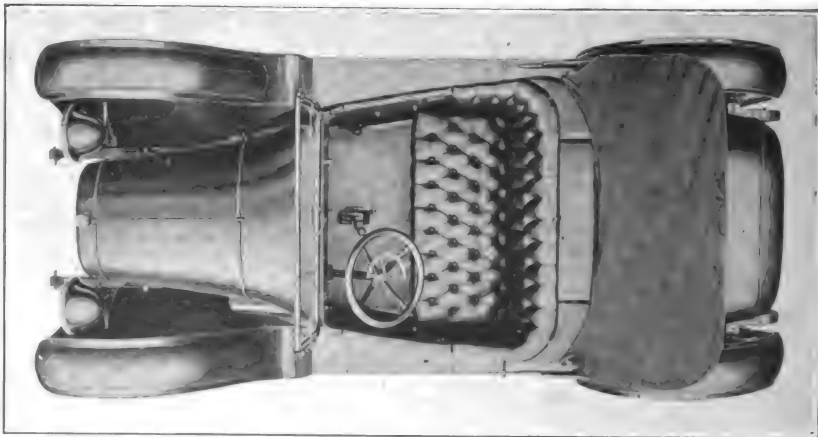
the outside push rod on the right side.

To insure quiet rocker action ball joint rocker arms are used, and the whole mechanism is enclosed on top of the motor. With the overhead valve construction the valves are made unusually large. They are $1\frac{1}{2}$ inches diameter and the lift is $\frac{9}{32}$ inches.

The motor has four cylinders with $3\frac{1}{2}$ -inch bore and five-inch stroke. While it rates by the S. A. E. formula at 19.6 horsepower, it has developed 36.4 horsepower by dynameter tests with the engine speed 1600 revolutions per minute. The entire valve mechanism, as well as the spark plugs, are enclosed in an aluminum housing at the top of the cylinders.

The entire motor head is removable, so as to give easy access to the pistons and valve seats without dismounting the cylinders. The cylinder casting is en bloc and is integral with the upper half of the crank case. There are liberal water passages in the head and cylinders to secure free circulation. The motor is cooled by a thermo syphon system, in which a Fedders honeycomb radiator is included.

The car is lighted and started by the Remy system. The generator is driven by the timing gears. On the other side of the motor is located the starting unit, which drives through a spur pinion that meshes with a ring gear on the rim of the fly-wheel. The storage battery is mounted on the right side of the



Plan View of the Inter-State Roadster, Showing Baggage Compartment, Tire Compartment at Extreme Rear and Roomy Seat.

and tops and body ledges are trimmed in the same genuine leather as the body. Real curled hair is used for upholstery.

The gasoline tank is carried under the cowl and fuel is fed by gravity to the carburetor. There is a filler cap for the tank that is easily accessible under the deck.

The equipment includes a one-man top of special mohair. All other equipment, which is very complete, is up to the standards established by other makers of first class American cars.

The entire chassis and body design has been developed with an eye to comfort and convenient handling in traffic or under any other conditions. Especial attention has been devoted to the weight distribution and proper proportioning of the load to the power of the engine.

A feature of the roadster body design that is unusual is the long running boards and the high arched rear fenders, which are identical with those used on the touring car. The roadster is also equipped with an extra wide double-ventilated windshield, which affords exceptional protection for the passengers.

When the specially designed one-man top is raised the windshield and the extra high sides of the car afford almost complete protection from the dust and wind and, to a large extent, from storms.

SERVICE MANAGERS HOLD MEETING.

Service managers of all the companies which are members of the N. A. C. C. met in Detroit, June 29 and 30 to begin the work of formulating a definite service policy that can be adopted by all the members of the association. Alfred Reeves presided at the meeting, which was addressed by Alvan Macauley, vice president of the Packard Motor Car Company, and a number of officers of other companies.

The convention agreed upon the desirability of a standard policy drawn in definite terms so that all dealers and purchasers should know just what is to be expected in the way of service. A committee was appointed to draw such a code, incorporating the ideas which received the greatest support from the convention. When this is drawn it will be again considered by the service managers and will then be submitted to the heads of the various companies, who will act upon it through the National Automobile Chamber of Commerce.

Among the points agreed upon was that it is desirable to begin an advertising campaign, backed by all manufacturers, to tell the owner

just what he may and may not expect in the way of free service from the dealer. The necessity of having a different service policy for trucks than that which applies to passenger cars was recognized. To protect regular dealers it was considered advisable not to sell parts to general repair shops at a discount. A system of censoring orders for parts sent in by dealers to prevent overstocking or understocking, through lack of experience as to probable demand, was considered a desirable part of the service system.

There were more than 90 representatives of the various service departments in attendance, and a representative of each company was called upon for his views.

Service work was found to be the leak through which most makers and dealers lost a large part of their profits, and Alvan Macauley declared it to be the most important question before the industry at present. Only those companies who manage to reduce their service expense and keep it down will survive, he said.

MACADAM'S ROAD ATLASES.

Among the several valuable features of the MacAdam's Road Atlases, which exhaustively cover southern New England, including New York City, eastern New York state and Portland, Me., is that the routes are presented in measured miles on the maps, so that the tourist can tell at a glance the exact distance between his starting place and his destination.

The atlas shows railroads, trolleys, highways, city streets and landmarks, and gives accurate information on road conditions and hotels. Every lake and pond, seashore, country, or mountain resort, as well as mountains and hills of any consequence, are indicated. Every city, town and village is registered, and every page of the total 104 contains, beside a sectional map, information that the motorist will find very valuable while traversing any of the routes outlined.

The atlas is pocket size, the maps are very distinct, and the covers are sufficiently durable for every purpose. It is published by the Atlas Press, Hartford, Conn., and sells for \$1 the copy.

Through the efforts of Mrs. Lee C. Boardman of New York City, who is prominent in the activities of the General Federation of Women's clubs, a party of prominent members of that organization is soon to make a trip over the Lincoln highway preliminary to the beginning of a campaign to beautify the highway by planting trees and shrubs along the way.

A SUCCESSFUL TAXICAB SERVICE.

AMONG the pioneers in the automobile renting service in Boston, Mass., were Messrs. Saunders & Butler, managers of the Fenway Garage, 169 Ipswich street. Foreseeing the increasing popular demand for cars that could be rented for short distance trips, they put two White "steamers" into service in the spring of 1907. Success was immediate; so much so that at the end of the season the equipment was increased to four cars.

By the end of 1908 seven cars were collecting fares. Further additions were made during the next few years, and in August, 1912, the Fenway Garage was formed, with 35 automobiles in operation. As the accommodations allowed storage for many cars in addition to the regular equip-

In supplying lubricating oil we always follow the chart and have yet to receive a complaint due to improper lubrication.

This, together with the fact that we have sold over 150 barrels of lubricating oil last year in small quantities, proves to us that the quality of Gargoyle Mobiloils is high and that if the specified grade is used, correct lubrication will be the result.

Today Messrs. Saunders & Butler operate 35 taxicabs, 11 limousines and touring cars, and a service truck, in conjunction with their garage. After eight years' experience in the automobile renting service this large equipment indicates the success they have achieved.

SIGNBOARDS FOR CANADA.

The Ontario Motor League is sign posting



A Pioneer and One of Boston's Largest Taxicab Service Stations and General Garage, Showing Its Large Fleet of Cars.

ment, the business was expanded to include up-to-date general garage service.

Years of experience and knowledge of the upkeep of automobiles early convinced the proprietors of the fact that correct lubrication was of vital importance in the efficient running of a car. In relating their experience with oils, Messrs. Saunders & Butler stated:

Over half of the engine troubles on cars which come into our garage to be repaired are caused by incorrect lubrication.

If the car owner realized how dependent the economical and efficient running of his car is upon correct lubrication, he would give the subject much more serious consideration.

All motors are not built alike. Motor construction and lubricating systems differ on different cars. They are not made to suit any particular oil. The oil should suit them.

We believe that only after a thorough, scientific analysis of the motor construction of each make of car, can an oil be made whose lubricating efficiency is high and whose body suits the lubricating requirements of the motor.

The Vacuum Oil Company has made such a study, and their chart of recommendations recommend the correct grade of Gargoyle Mobiloils for each make of car.

the motor roads of the province. The signs are of conspicuous appearance, with a black ground and yellow arrows, which bear either the name of the town toward which the arrow points or the word "danger." Each sign bears the initials of the Ontario Motor League.

Auto Suggestions, the house organ of the Northwestern Chemical Company, Marietta, O., maker of "Chemically Correct" auto specialties, contains some snappy items of interest to dealers and salesmen, as well as consumers. A new window display contest for dealers is announced in the last number.

A new ruling of the postoffice department makes it possible to mail automobile tires, provided they come within the requirements of the parcel post regulations as to weight.

GENERAL NEWS OF THE INDUSTRY.

Studebaker Has New President—Madison Company Announces Business Policy— More Ford Developments—Chalmers Promotions.

ALBERT R. ERSKINE was elected president of Studebaker Corporation at a meeting of directors held in New York City, July 7. Mr. Erskine became treasurer of the Studebaker Corporation in 1911 and in 1913 was elected vice president and treasurer. He is a young man, as corporation presidents go, being only 44 years old. He was born at Huntsville, Ala., and his first position of importance he reached at the age of 27, when he became general auditor of the American Cotton Company in New York. He left that position in 1904 and for the following six years

Company of Indianapolis and prominent in the National Automobile Chamber of Commerce, who has been connected with the Studebaker Corporation since last March, becomes treasurer.

MADISON ADOPTS NEW POLICIES.

The 10-acre plant of the Madison Motors Company, Anderson, Ind., has begun its production and Cecil Gibson, president of the company, reports that deliveries of one of the new models, the "Dolly Madison," are already underway.



Plant of the Madison Motors Company, Anderson, Ind., Which Occupies Approximately 10 Acres.

was treasurer and member of the executive committee of the Yale & Towne Manufacturing Company of New York. In 1910 and 1911 he was vice president of the Underwood Typewriter Company, which position he resigned to go with the Studebaker Corporation.

J. M. Studebaker, the surviving one of the five Studebaker brothers who founded the business, still stays at the head of the corporation as honorary president, having resigned as chairman of the board of directors. Mr. Fish, who relinquishes the presidency, becomes chairman of the board and of the executive and finance committees. C. C. Hanch, formerly of Nordyke & Marmon

President Gibson has announced the general lines of policy on which the company will be conducted. Several points are distinctly new. A very strong appeal is to be made to dealers. They will be taken into the confidence of the company on matters pertaining to design and business policy and the majority sentiment among them will decide the company's course. This angle of policy is perhaps due to the fact that President Gibson was himself for many years a dealer.

Production Manager W. E. Moore announces that the company will not feature standard parts, on the ground that the names of such parts enable their makers to get higher prices than parts

of equal quality made by less known producers. By careful testing and selection among the smaller parts makers the company believes it can produce a high quality car at considerably less than the average market price.

FORD PLANS MODEL INDUSTRIAL CITY.

In addition to his plans for a large industrial centre on the River Rouge, in the outskirts of Detroit, Henry Ford is also planning a model industrial community wherein his employees engaged in the tire factory, blast furnace and motor plant in contemplation can live in ideal conditions at a minimum of cost.

"A large part of the property along the river," said Mr. Ford, "will be sold to my employees at just about the price which I paid for it. Then I



A. R. Erskine, President of Studebaker Corporation.

expect to see a model village develop around the new plants. The \$5 a day rate of wages in force at our Highland park plant will be extended to the factories on the Rouge river. I want every employee to have space for a small garden adjoining his home.

"We expect to have our own fleet of boats to carry ore up the River Rouge and transport machines destined to foreign countries through the Welland canal. I hope to see the river widened sufficiently to render it navigable."

The proposal to increase the capital stock of the company from \$2,000,000 to \$100,000,000 has been halted, possibly for two years, it having been discovered that the laws of Michigan prohibit a capitalization greater than \$25,000,000. Rather than reincorporate in another state, it is understood that the company officials will await the opening of the Michigan legislature two years hence and attempt to have the necessary legislation passed to carry out the proposed capital increase. Reincorporation in another state would mean that the Ford company would have

to pay a tax to the State of Michigan of 2½ per cent, as a foreign corporation.

INTERNATIONAL MOTOR IMPROVING.

That recent improvement in business has made unnecessary the reorganization of the International Motor Company that was expected in some quarters and has put the company on a sound financial basis is the statement of a financial expert. It is unlikely now that there will be any scaling down of capitalization. The company has obligations that do not fall due until the fall of 1916, and present indications are that these debts can be paid out of the treasury fund.

The war has been the cause of part of the improvement, the company's factories being busily engaged in turning out Sauer trucks for shipment to England, France and indirectly to Belgium. The demand for Mack trucks for domestic use is steadily increasing.

The company is now earning net at the rate of \$90,000 a month, and it is predicted that in the current year to Dec. 31 next, a surplus of \$700,000 will be earned. This amount is after charging off interest on the funds advanced by stockholders in the company who agreed to forego interest on their advances. Those earnings are equivalent to 19 per cent. on the \$3,600,000 seven per cent. cumulative preferred stock, on which no dividends have been paid since September, 1912. In common stock the company has \$5,628,125 outstanding.

BRIGGS-DETROITER BANKRUPT.

The Briggs-Detroit Company, Detroit, manufacturer of the "Detroit" car, has been adjudicated bankrupt by L. S. Joslyn, referee in bankruptcy, and the affairs of the company placed in the hands of the Detroit Trust Company as receiver. The liabilities are estimated at \$350,000, and the assets at \$175,000, according to a superficial inventory.

The interests of merchandise creditors are being attended to by a creditors' committee consisting of the following: M. A. Moynaham, Gemmer Manufacturing Company; Louis S. Smith, Griswold Motor and Body Company; R. H. Davis, Penn Spring Company; Mr. Brooks, Kelsey Wheel Company, and L. W. Goodenough, attorney.

An offer of \$65,000 for the assets, exclusive of land and buildings, has been made by A. O. Dunk, president of the Puritan Machine Com-

pany, and at the creditors' meeting, July 15, it will be considered. Creditors would obtain about 33 1/3 per cent. on their claims from this offer.

KLAXON WINS AGAINST SPARTON.

In the infringement suit of Lovell-McConnell Manufacturing Company against Oriental Rubber and Supply Company, in the eastern district of New York, Judge Chatfield has rendered an opinion holding Hutchinson patent No. 1,120,057 to be valid and infringed by the Sparton horn, made by the Sparks-Withington Company.

The Hutchinson patent is one of the 18 new mechanical patents, covering important details of horn construction, which were brought out by the Lovell-McConnell company within the last year, with a view to immediate enforcement against infringers, when the basic Klaxon patents were declared "invalid or not infringed" in the Newton suit.

A number of other suits on the same group of recent patents have been filed. One has been tried and is awaiting the decision of the court.

MILLER OF CHALMERS PROMOTED.

H. W. Miller, formerly of the Studebaker, Maxwell and Lozier companies, has been appointed assistant to Sales Manager Paul Smith of the Chalmers Motor Company. He has been closely associated with Mr. Smith for the past five years, during which time he has had direct charge of the sales office work with the above named companies.

Mr. Miller hails from Michigan City, Ill., and his first introduction to the automobile industry was made when he joined the Studebaker company at South Bend, Ind. Later he went to the Detroit factory, entering the sales department, then under Paul Smith. With the Lozier company Miller had full charge of the service department, in conjunction with his sales work.

RECEIVER FOR NEW-LITE.

C. C. Quinn, secretary and treasurer of the Quinn Wire and Iron Works, Boone, Ia., has been appointed receiver of the New-Lite Manufacturing Company, Newton, Ia., with power to hold same and operate the plant under direction of the district court of Boone county. The financial condition of the company is given as the reason for the step, and the action is taken to conserve the interests of all parties. The receiver

has been authorized to borrow the money necessary to keep the plant in operation, pending plans for financing the company, which are now under consideration by the stockholders. The application for receivership was friendly.

BOYLE IS STEARNS ADVERTISER.

Frank B. Stearns, president of the F. B. Stearns Company, announces the promotion of T. A. Boyle to the position of advertising manager and manager of the service department, and of Guy W. Vaughan to special sales representative. Mr. Boyle has been with the Stearns organization eight years and until recently was assistant advertising manager. Mr. Vaughan has been head of the experimental department and is widely known as a champion race driver and the holder of numerous trophies.

STUDEBAKER MEN INSURED.

A contract has been entered into by the Studebaker Corporation whereby the life of every man in the employ of the corporation is insured regardless of the length of time he has been with the company. No medical examination is necessary, as the one conducted by the company before the man is taken as an employee is accepted. The policy covers several million dollars worth of insurance, divided in fixed amounts for each individual.

KELLEY HEADS ELECTRIC MAKERS.

George H. Kelley, secretary of the Baker R & L Company, the new merger in the electric vehicle field, was elected president of the Electric Vehicle Manufacturers' Association at the annual meeting held recently in Cleveland. He is thoroughly in touch with all the needs and problems of the electric manufacturers and will attack them aggressively in his new position.

J. S. Patterson, advertising representative for many years for the Chicago Record-Herald and Examiner, and more recently for the New York Globe, has been appointed director of publicity for the Hupp Motor Car Company, and is now located in Detroit.

R. J. Metzler, who bought the entire plant and good will of the S. G. V. Company, will continue the production of that car. He will establish a new plant at Newark, N. J., or Long Island City, N. Y.

WILLIS IS SMITH'S ASSISTANT.

Frank B. Willis has been appointed assistant to Paul Smith, sales manager of the Chalmers Motor Company. Before taking this position Mr. Willis was Chalmers' manager for the eastern district. He will spend the larger portion of his time in the field.

He has been in the automobile business for 15 years. For seven years he was with Carl G. Fisher in Indianapolis, for two years he was Packard dealer in Indianapolis, and later managed the Studebaker branch in that city. In 1912 he joined the E. M. F. organization, and was assistant sales manager under Paul Smith at the Lozier in 1913. He has become intimately acquainted with 33 makes of cars.

HENRY A. LOZIER BANKRUPT.

Henry A. Lozier, vice president of the old Lozier Motor Car Company, has filed a petition in bankruptcy, alleging liabilities of \$768,005 and assets of \$250. The majority of liabilities are for suits in the supreme court of New York. Two heavy liabilities are the secured claim of John T. Lozier of New York for \$17,700 and the unsecured claim of William B. Cary for \$44,000.

MONARCH MOTOR LOSES THREE MEN.

H. W. D. Mackaye, sales manager; A. A. Lehr, purchasing director, and W. W. Bamford, production manager of the Monarch Motor Car Company, Detroit, recently severed their connections with the company soon after the announcement of a change in the board of directors and management. The plans of the three men have not been announced as yet.

GILMER COMPANY TO BUILD.

The L. H. Gilmer Company, Philadelphia, manufacturer of the Gilmer endless belts and automobile parts, is experiencing a great increase in its business and recently purchased two acres of land at Tacony station, on the Pennsylvania railroad, where a modern factory building will be erected immediately.

CHALMERS' SUPERINTENDENT.

C. Snyder, connected with the Chalmers Motor Company for six years, and associated with Hugh Chalmers for 14 years, has been promoted

to the position of superintendent of manufacturing, and will have complete charge of the manufacture of all parts from the rough stock to the finished car.

Mr. Snyder was efficiency man for the National Cash Register Company, Dayton, before joining the Chalmers company along efficiency lines.

HINES BECOMES BUICK AGENT.

Jack C. Hines, formerly travelling representative for the Motor Car Equipment Company of Boston and New York City, is now associated with the Fitchburg Auto Company, at Fitchburg, Mass., which is agent for the Buick car. Its plant is one of the most modern and best equipped garages in the East. Mr. Hines is widely known in the New England trade.

HUFF IS NOMINATED.

Russell Huff, consulting engineer of the Packard Motor Car Company, has been nominated for the presidency of the Society of Automobile Engineers. Nomination is generally understood to be equivalent to election.

Mr. Huff is recognized as one of the foremost engineering authorities and has been identified with the Packard development since the enterprise was inaugurated in Warren, O., 16 years ago.

The Prest-O-Lite Company of New England, Boston, Mass., is now established in new and larger quarters in Boston's Motor Mart, at 16 Columbus avenue, according to the announcement made by Manager Dodge, to whom the growth of the company is due in large measure.

C. A. Bolton, formerly manager of the Providence branch, is now assistant manager of the Boston house.

J. G. Carr, formerly with the National Motor Car Company, Indianapolis, and Paul Morford, formerly with the Regal Company, Detroit, have been appointed district sales managers for the Herff-Brooks Corporation.

During the last year the Ford Motor Company of Canada, Ltd., spent approximately \$1,000,000 in additions and improvements to the four plants in the Dominion. That sum was divided among the plants as follows: Ford, Ontario, about \$300,000; London, \$140,000; Montreal, \$250,000; Toronto, \$325,000.

STUDEBAKERS LARGER AND MORE POWERFUL.

More Roomy Bodies and a Larger Engine in Cars That Have Been Improved in Quality—Seven Passenger Four \$885, Six at \$1050.

STUDEBAKER cars with larger engines, more roomy bodies and many minor improvements will be sold during the next year at great reductions in price. Claim is made that the new cars have the greatest value that has ever been given by the Studebaker corporation. The seven-passenger, four-cylinder car, sells for \$885, and the seven-passenger, six-cylinder car for \$1050.

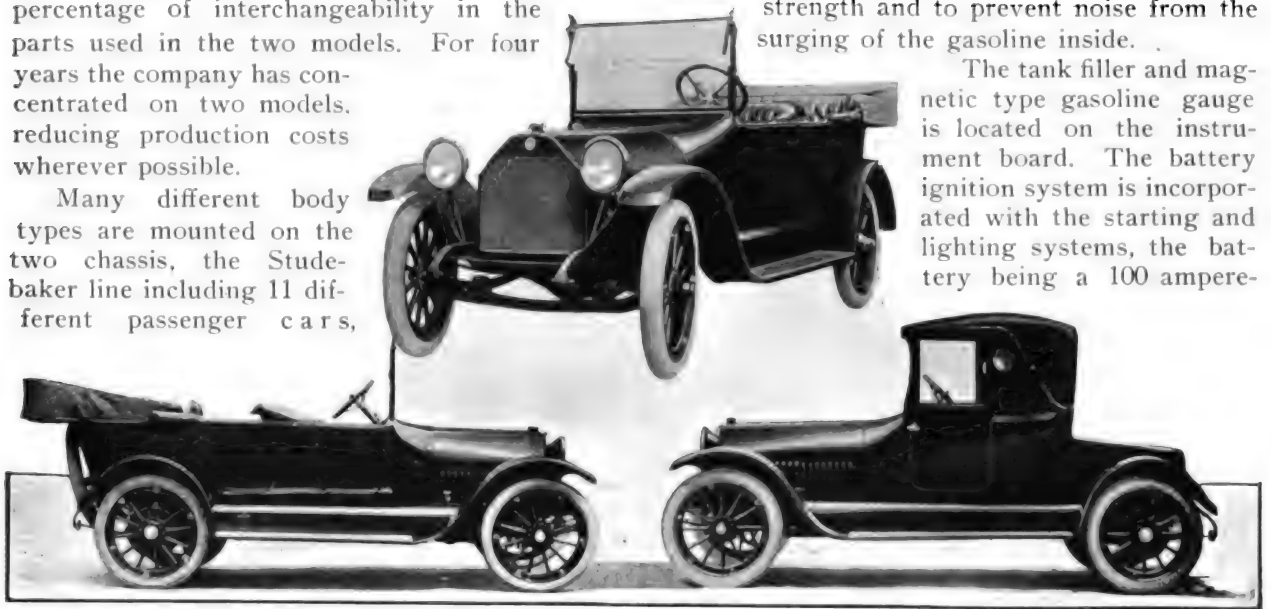
This large increase in value is made possible by the larger volume of production and the high percentage of interchangeability in the parts used in the two models. For four years the company has concentrated on two models, reducing production costs wherever possible.

Many different body types are mounted on the two chassis, the Studebaker line including 11 different passenger cars,

mensions of the connecting rods have been increased. The pushrods are easily removable, and other features have been incorporated, such as a redesigned dust guard, which will not rattle and is easily removable.

The carburetor is a Schebler with a hot air intake attached to a stove on the exhaust manifold. It can be adjusted at the steering column. Gasoline is carried in a tank under the cowl and feeds by gravity. The fuel tank is made with rounded ends and curved sides to have increased strength and to prevent noise from the surging of the gasoline inside.

The tank filler and magnetic type gasoline gauge is located on the instrument board. The battery ignition system is incorporated with the starting and lighting systems, the battery being a 100 ampere-



Three-Quarter Front View of Studebaker Six-Cylinder, Seven-Passenger Touring Model—Four-Cylinder, Seven-Passenger Touring Model—Six-Cylinder Three-Passenger Landau Roadster.

ranging in price from \$885 to \$2250. Both four and six-cylinder engines are of the block cast type and they have been designed to afford great accessibility. The bore in both four and six-cylinder motors is $3\frac{7}{8}$ inches and the stroke is five inches. This gives a piston displacement in the former engine of 235.3 cubic inches, which is rated at 40 horsepower, and of 353.8 cubic inches in the six, which is rated at 50 horsepower.

In general design these motors are similar to those built last year, although they are larger and quieter. Rigid crankshafts are used and the di-

hour Willard. A Remy coil, interrupter and distributor are included in the system.

The motors are lubricated by circulating splash systems. A noiseless gear pump is actuated from the rear of the camshaft. With the exception of one pipe leading to the pressure gauge on the instrument board, all outside piping has been eliminated and danger of oil leaks has thus been reduced to a minimum.

Large Capacity Cooling System.

The cooling systems have large capacity and big radiators. The radiator of the four-cylinder chassis is tubular type and that on the six-cylin-

der chassis is cellular. In both systems water is circulated by centrifugal pumps and six-blade, 18-inch ball bearing fans draw air through the radiators.

In the clutches the bronze collars formerly used have been replaced by ball bearings, which wear less and require practically no attention. The propeller shafts have been made more substantial and whipping has been prevented by increasing the diameter from $1\frac{1}{8}$ inches to $1\frac{5}{16}$ inches.

The speed change gear boxes are bolted through flanges to the pressed steel housings of the rear axles, and on the left sides are attached pressed steel torsion arms, which are connected at the intermediate cross member of the frames. Radius rods extend forward to the side members of the frames.

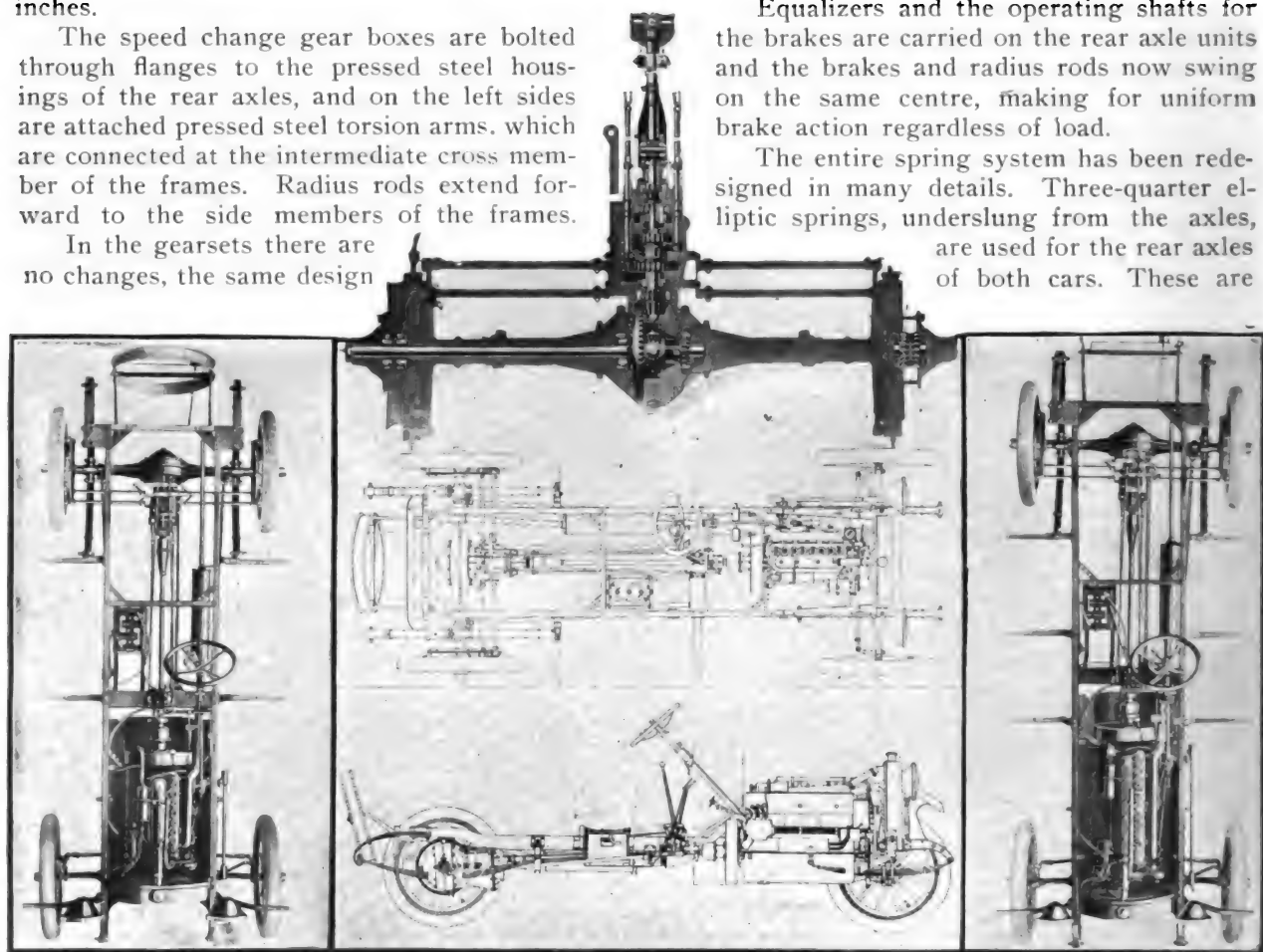
In the gearsets there are no changes, the same design

have been dropped at the spring seats.

Seventeen adjustable Timken bearings are employed in each car, two in each wheel hub, two in the differential, and three in the gear box. In the gear box are also used Hyatt roller and ball thrust bearings. The plain bearings at the engine crank pins are high tin babbitt and have unusually ample surfaces. The crankshaft bearings are the same grade of babbitt, backed by a bronze shell, while the piston bushings are bronze.

Equalizers and the operating shafts for the brakes are carried on the rear axle units and the brakes and radius rods now swing on the same centre, making for uniform brake action regardless of load.

The entire spring system has been redesigned in many details. Three-quarter elliptic springs, underslung from the axles, are used for the rear axles of both cars. These are



Four Views of the Chassis and Sectional View of Rear Axle and Transmission System, Which Is Continued in the New Models.

and chrome nickel steel components being used. The axle housings have been made heavier. The four-cylinder car has a rear axle gear ratio of four to one, while that of the six-cylinder car is 3.7 to one.

The rear axles are full-floating types, with pressed steel housings. There are two adjustable roller bearings in each wheel hub. The front axles are drop forgings and two adjustable roller bearings are fitted in each hub. To lower the cars without reducing the spring action the front axles

51 inches long. The front semi-elliptic springs are 38 inches length. Last year's four had semi-elliptic rear springs, and those of the six were three-quarter elliptic. The cars have a lower centre of gravity than formerly from the lower position of the rear springs and the dropping of the front axle at the spring seats.

The frames are stronger this year from the fact that fewer holes are bored in them and these are not in line. A long tail pipe has been fitted

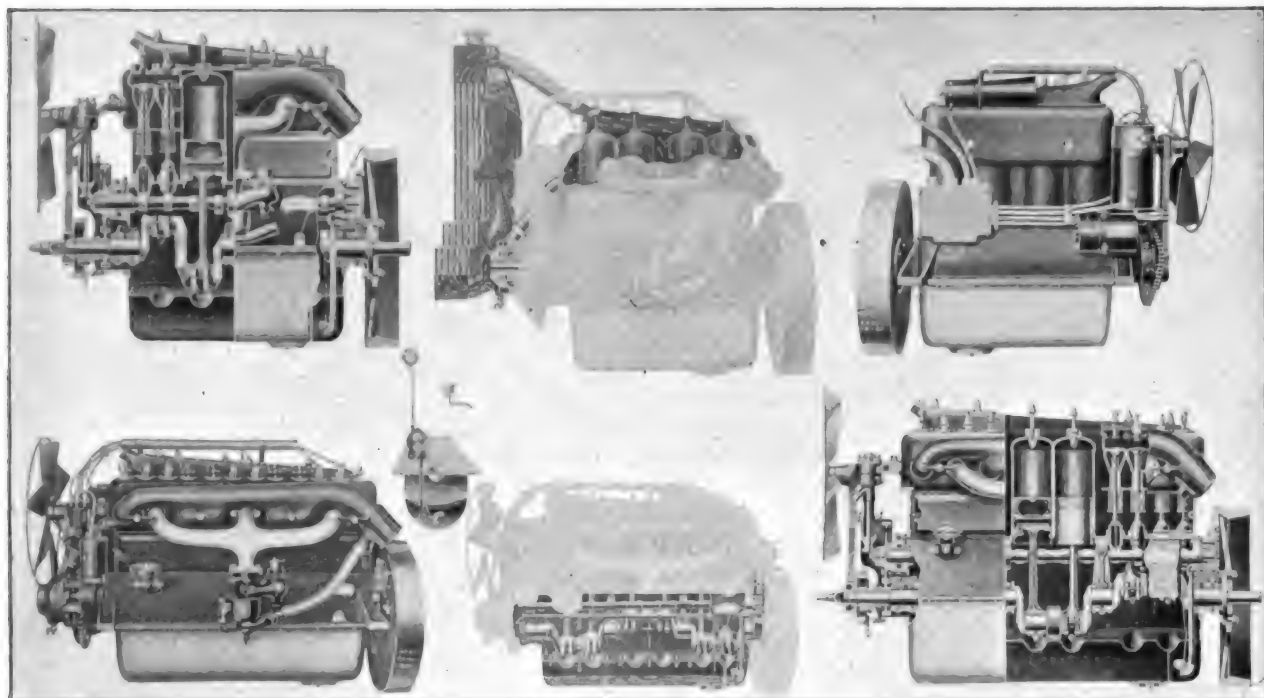
to the muffler to carry the exhaust further back. The wheelbase has been increased from 108 to 112 inches in the four and from 120 to 122 inches in the six.

The tires are 34 by four inches in either chassis, while on last year's four-cylinder, 33 by four-inch tires were used. Straight side tires are adopted, the rear set being of the non-skid type. A new rim has been fitted which is characterized by a form of pawl lock that makes the detachment of the tire easier.

The increase in wheelbase affords greater body room. The bodies are well proportioned

The bodies are sheet metal construction. They have steel panels and invisible welded seams, rigidly braced. The doors are broad and U shaped, with concealed hinges and door lock levers, door pockets and handsomely designed moldings. The floor in the front compartment is of linoleum, bound with aluminum. In the rear compartment the carpet is carried up the front of the back seat to prevent marring of the finish.

All cars are finished in deep blue with running gear in black, and black enamelled hood, fenders and similar parts. All the bright parts are aluminum or are nickel plated. The fenders



Full, Sectional and Phantom Views of Four and Six-Cylinder Motors Used in Studebaker 1916 Models—Sectional Views Show Details of Both Motors, and Phantom Views Show Cooling and Lubricating Systems.

and have excellent lines, although every effort has been made, in accordance with the Studebaker policy, to avoid an extreme style. The lines of the bonnet blend harmoniously with those of the body in all types.

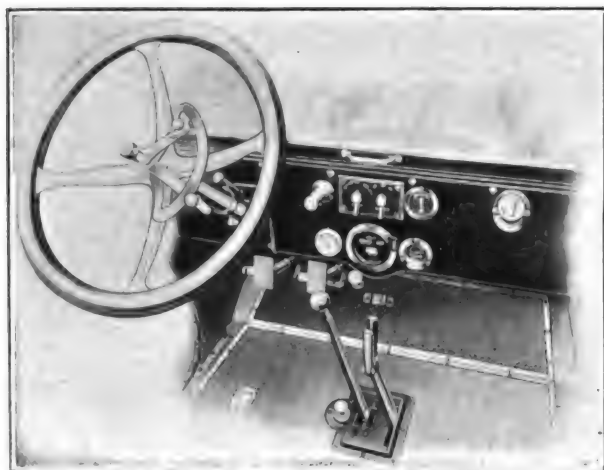
Rounded Front Seat Backs.

The backs of the front seats have been shaped to fit the backs of the passengers, really making individual seats for them. The new form of auxiliary chair folds into compartments in the floor of the tonneau and when not in use they are flush with the floor. When unfolded the chairs leave a sub-floor exposed, upon which the occupant of a seat can comfortably rest his feet.

have been redesigned and are of extra deep crown type with concealed rivets.

The steering gears are worm wheel and worm type, mounted on ball bearings. These are irreversible and can be readily adjusted to take up wear. The steering wheels are 18 inches diameter. The steering post is located at the left side and the control levers are in the centre. Both sets of brakes act in and on rear wheel drums, which are 15 inches diameter and two inches wide. The pedal-operated service brake is a contracting type and the lever operated emergency brake is internal expanding. Multibestos fabric is used for lining both sets.

The Studebaker-Wagner electric lighting and starting system, which was developed four years ago and since last year has been made in two



The Remodelled Studebaker Dash and Neat Grouping of the Controls.

units, is continued. The starting motor is placed at the front and on the right side. It is arranged horizontally and drives from the crankshaft through a roller chain connection, and a housed-in train of reduction gearing. The chain is not enclosed and is placed between the fan pulley and the gear housing. The driving sprocket has nine teeth and the sprocket on the camshaft end has 40 teeth. In the front gear driving system of the starting motor silence is secured by making the main shaft and generator gears of case hardened steel, with the camshaft gear of cast iron, thus running steel against iron.

The lighting is, of course, electric throughout. Large headlights are fitted with parabolic reflectors, which can be easily focussed and instantly dimmed. The headlights can also be inclined to regulate the direction of the light. The wires leading to the headlights are concealed in pillar supports.

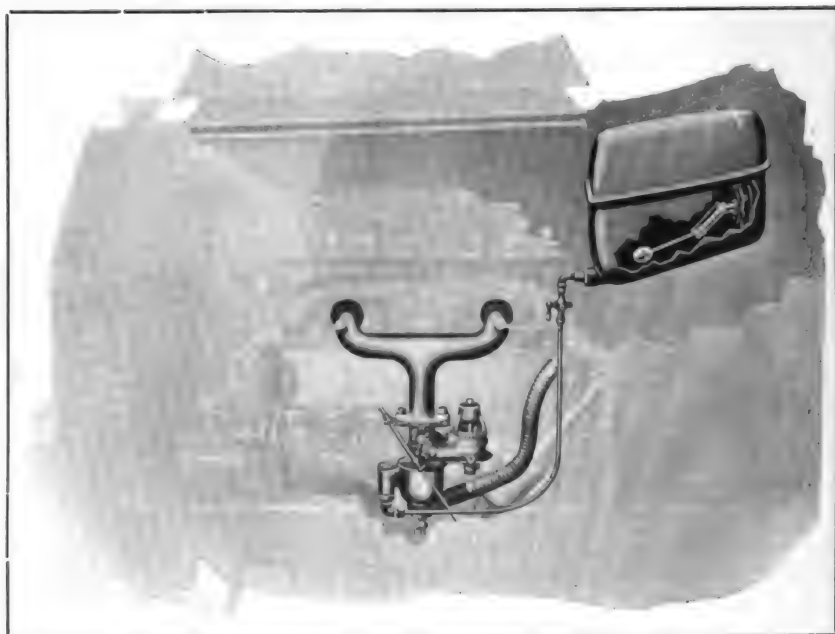
There are no side lights, for with the dimming of the headlights these are unnecessary, but in addition to the headlights there is a tail light and a dash lamp. All wiring is carried in steel conduits, which protects against dirt, oil, heat, water and mechanical injury.

The single-wire lighting system is used, which insures ample connections for the lamps and greatly simplifies the wiring. All wire connections are complete units and may be put on or removed from the car as such. All wires lead to a junction and fuse box beneath the hood. As a result of this wiring system the body can be easily removed from the chassis. Switches are all of the rotary type and can be conveniently reached on the instrument board.

Any combination of lights may be obtained and the ignition switch can be secured by a lock should the driver need to leave his car. A battery indicator is included in the dash equipment. The dash is of trim design, all instruments being set flush in it.

The Sparton electric horn is part of the equipment. It is operated by a button switch located on the top of the steering column.

President H. B. Joy of the Lincoln Highway Association recently completed a trip from Detroit to San Francisco over the Lincoln highway in one of the new Packard Twin-Sixes. Several weeks of heavy rain before the trip began and during its early stages made progress very difficult in some parts of the road and three weeks were required to reach San Francisco. Since then dry weather has made the roads much bet-



Fuel Supply System of the Studebaker Models, the Tank Being Located in the Cowl.

ter. Tremendous improvement has been made in the road during the past two years and traffic over it has tripled in volume, Mr. Joy declared.

SUGGESTIONS FOR THE FORD CAR OWNERS.

The Limitations of the Gas Engine Speed Regulation and the System of Transmitting Power From the Motor to the Road Wheels of the Machine.

The 27th article dealing with the construction, operation, maintenance, care and repair of the model T Ford chassis is devoted to the consideration of the means of transmitting the power developed by the engine to the road wheels and the manner of obtaining different ratios of vehicle movement.

SIMPLIFICATION being the primary purpose of the design of the power plant of the Ford model T chassis, the clutch and the power transmission system gearset, by which different ratios of vehicle speed are obtained, are combined, and these are housed within the rear extension of the engine case. While there is but one assembly, the clutch and the gearset have the same functions and serve the same purposes as if they were separate units.

The reader understands that the internal combustion motor differs from the steam engine or the electric motor in that it is not reversible, and that it must always be driven in the same direction. The power of a steam engine is obtained from the pressure and volume of steam admitted to the cylinders, the pressure being governed by boiler control and the volume of steam being regulated by the opening and closing of the throttle valve, this varying the time for the steam to enter and fill the cylinder. By a simple mechanism the engine can be reversed and it can be driven backward with equal power production as when driven forward.

Steam Pressure Constant.

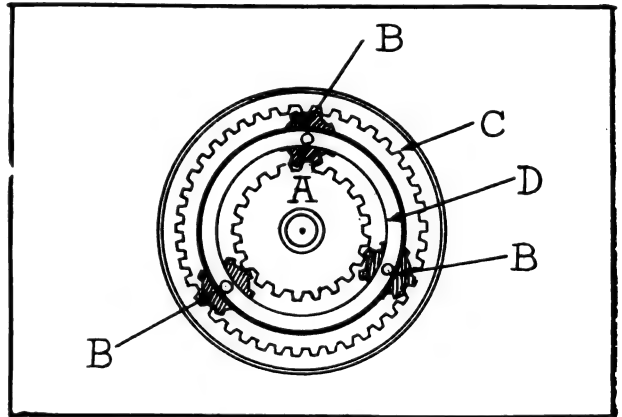
The steam pressure of the engine can follow the piston to nearly the end of the stroke, but the expansive force of the internal combustion motor is greatest at the beginning of the expansion stroke and decreases as the piston is moved in the cylinder. Because of the uniformity of the steam pressure the engine may be worked at slow speed and produce great power—that is, with it one can apply power very slowly, a familiar illustration being a locomotive starting with a heavy train from a stop. With a given steam pressure the opening of the throttle is the governing factor, and engine speed can be very accurately controlled.

The regulation of the engine turning either forward or backward is exactly the same, and with variable steam pressure and throttle opening the steam engine has what may be regarded

as the most accurate control of applied power. There is a flexibility that cannot be approached with the internal combustion engine.

Control of the Electric Motor.

The electric vehicle motor is equally as well controlled, but in a different manner. The series wound motor will adjust itself automatically to a load with a given current supply. That is, it will absorb a stated value of current and will utilize this only. In climbing a gradient it will move slower until the force of gravity will cause it to stop from the weight of the load. By different groupings of the cells the power is applied and one can utilize momentarily, or so long as may be required, all of the current available in the cur-



General Type of Planetary Gearset: A, Gear Attached to Engine Shaft; B, Three Equidistant Pinions Meshing with A; C, Internal Ring Gear Meshing with the Pinions B; D, Plates or Rings Carrying the Pinions B. When C is Held Stationary the Pinions B Turn in the Same Direction as A, Giving a Slower Forward Ratio; When C is Held Stationary the Ring Gear Turns in the Opposite Direction to A, Giving a Reverse Movement.

rent, the only limitation being the heating of the motor and the system of power wiring. By switching the motor can be reversed and the vehicle can be driven backward as rapidly as forward.

Obviously, with either the steam engine or the electric motor there is a very wide range of control and there is no need of reduction or reversing gearing, but with the gasoline engine, where power is obtained purely through speed, the best application is as near a standard number

of revolutions as is practicable with such reductions as may be desirable. Simplification has necessitated but one reverse ratio, and general practise is to have from two to four forward speed ratios. More ratios would entail more costly and complicated construction, and less machinery and intelligent operation has been adopted as the better economy. By slipping the clutch with cone and multiple disc clutches, and by varying the motor speed, practical power application can be obtained.

Flexibility and Reserve Power.

That there may be no confusion in the mind of the reader, a qualifying statement is necessary. Emphasis has been made that the steam engine and the electric motor have great flexibility and the exact power requirement can be obtained

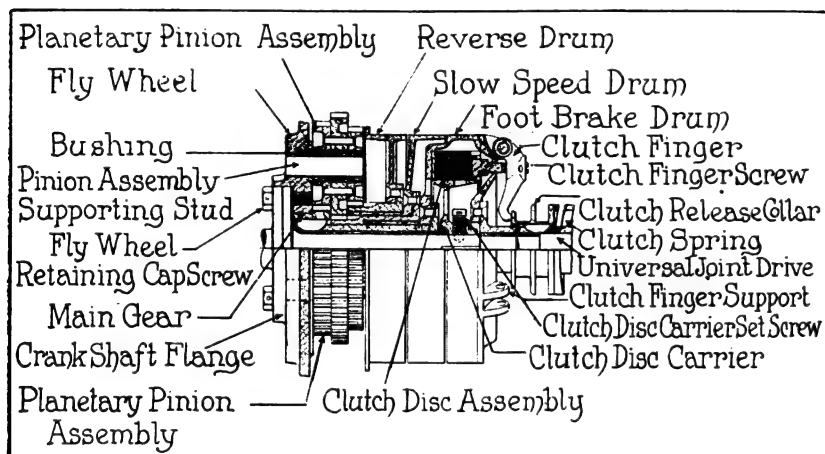
capacity is not given as the normal rating of the motor.

Characteristics of Power Production.

The gasoline engine obtains its power through speed, and this power will increase to a specific number of revolutions a minute, from which point on power will be decreased as the speed increases. There is no arbitrary rule that will apply to power production, because much depends upon the design of the engine, but the principle is certain, and the energy developed from minimum to maximum can be definitely computed. Maximum speed means high fuel and lubricant consumption, and there is the element of mechanical wear that must be considered, so for these reasons the motor should best be driven at a speed well within its limitations, save in emergent

conditions. This justifies the statement that conservative operation is at as nearly a constant speed as is practicable, and the difference between this standard and the maximum may be considered a reserve.

But if an engine is operated at constant speed the vehicle must be driven at variable speeds, and not only this, more power is necessary for starting than when a machine is moving. Were sufficient power for starting utilized direct the result would probably be destructive of the mechanism of the car, so the power must be applied differently, which is



Sectional Drawing of the Planetary Type of Gearset Incorporated in the Power Plant of Ford Cars, in Which Changes Are Made by the Use of Spur Gears and Sleeves on Which Drums Are Mounted, Carried by the Flywheel and Engine Shaft.

without reference to number of revolutions a minute, and that either can be driven in reverse as efficiently as forward. Both of these obtain power through pressure, the one from the steam and the other from the voltage of the electric current. So long as the pressures obtain a definite maximum power production is certain, but only so much power as is necessary to do a work is absorbed and there is normally a considerable reserve. The reason for this reserve is that the rating of a steam boiler is for normal operation and its overload capacity is not stated. The electric motor is designed to endure varying overload, from 200 to 300 per cent. being safe with standard types, but the longer the overload is carried the less it should be. By this is meant that there is a definite ratio, such as 300 per cent. for 20 minutes, 200 per cent. for 40 minutes, and perhaps 175 per cent. continuously, the critical point being the heating of the motor. But the overload

done through the reduction gearing.

The use of the reducing gear is merely to apply a longer lever arm or leverage. This may be illustrated by the application of the lever to lifting a given weight. As the lever is lengthened less power is required to lift the weight, and as the ratios of the gears are increased or decreased with relation to each other, the application of the power is correspondingly varied. What is known as the high or direct speed means that the main driving shaft is coupled to the crankshaft of the engine and turns the same number of revolutions. The intermediate and low speed ratios with most power transmission gearsets reduce the number of revolutions of the main shaft as compared with crankshaft speed, and where is a fourth or highest ratio the driving shaft is sometimes driven faster than the engine, which means maximum vehicle speed. This applies to what is known as the sliding gear type of gearsets, although there are

several manufacturers who build such gearsets that have but low and reverse speed ratios other than the direct or high speed.

Planetary Type Gearset.

The planetary type gearset differs from the sliding gear in that a set of gears rotate around a central gear in such a way that holding the axles of the sets of gears stationary, or holding an enclosing ring gear stationary, or allowing the whole mechanism to revolve as a unit, will give a low forward speed, a reverse speed or high or direct speed respectively. The accompanying illustration of the principle of a planetary gearset is worthy of study.

The ordinary type of planetary gearset is constructed by attaching a shaft carrying two spur gears to an engine so that this shaft with its gears turns with the engine. Placed around each of the two gears are three gears, spaced equidistant, which are always in mesh with the shaft gears. These outer gears are mounted in rings or plates around each of the shaft gears and are carried on pins on which they revolve, and one set of the outer gears are meshed with an internal ring gear which completely encloses them.

The rings or plates have metal drums around their outer edges, which form the cylinder cases for the gearsets. By preventing the internal gear from turning, the shaft from the gearset moves slower in the same direction as the engine shaft, affording a slower speed forward; preventing the other drum from turning causes the rear shaft to turn slowly in the opposite direction, affording a reverse movement of the main driving shaft. Direct drive is obtained by a clutch of the cone, plate or disc type at one end of the gearset shaft, which causes the shaft to turn at the same speed as the engine shaft.

(To Be Continued.)

CHALMERS CLUB ENROLLS 6000.

Of the 50,000 Chalmers owners in the country who are eligible to membership in the Chalmers club, 6000 have sent in applications for this new organization, which was recently launched by Hugh Chalmers to bind together Chalmers owners. Each member is given a card signed by Hugh Chalmers and the local dealer and in travelling about the country the presentation of the card at any Chalmers selling agency will assure prompt and willing service.

The official magazine of the organization is the Chalmers Clubman, of which the second number has recently appeared.

SEEKS VOLUNTEER WAR CHAUFFEURS.

The War Relief Clearing house in Paris has sent out the following appeal to Americans:

"The French War Relief fund wants immediately volunteer chauffeurs for service in Normandy and Brittany. They should be able to provide for themselves.

"The work is transportation of surgical supplies from headquarters at Havre or St. Malo to the small hospitals in the outlying districts. It affords opportunity for conversing with many wounded soldiers and for the experience of war conditions at present prevalent in France.

"Volunteers should apply by mail to H. H. Wilcox, Newtonville, Mass."

CONTINUES TIRE GUARANTEE.

The Goodyear Tire and Rubber Company announces that it will continue through July, August and September its offer to refund the entire purchase price of Goodyear S-V tires, which do not prove superior to competing makes on a basis of cost per mile. The offer requires that the tire be tested out against competitors on the same truck under the same conditions.

During the preceding three months the guarantee plan has been found to be very successful, and its continuance is due to the fact that a great many users could not take advantage of it during that time because their tires did not then need replacement.

DIXIE HIGHWAY PUBLICATION.

"The Dixie Highway" is the name of the official publication of the Dixie Highway Association, which is put out in newspaper form. The first number, dated July 5, shows many evidences that the propaganda for the north and south road is making great progress. Reports from various sections through which the road passes indicate that actual construction is under way at many points.

Registrations in Indiana already surpass in number those for the entire year of 1914. To date 75,000 have been issued and the total for the year is expected to come to more than 90,000. In 1914, 66,500 were issued.

Minnesota registrations amounted to 73,300 on June 1, and Secretary of State Schmahl believes the number will amount to 100,000 by the end of the year.

FORD CAR ACCESSORIES AND EQUIPMENT.

SECURITY WINDSHIELD VENTILATOR.

A Positive Locking Device That Permits the Windshield to Be Tilted to Ventilate the Driver's Compartment.

In addition to its large variety of Ford specialties, the Security Company, 56 Terminal way, Pittsburg, Penn., is now making an ingenious device that makes it possible to so tilt the windshield and securely lock it into position as to deflect the air to around the pedal slots, through which the heat from the engine escapes into the driver's compartment. In the higher priced cars ventilators are either placed in the dash, or adjustable windshields provided, so as to minimize the engine heat, which otherwise would make riding in that compartment uncomfortable in warm weather.

The locking ventilator consists of a stationary member, which is attached to the front dash, and an adjustable component that fastens to the lower rim of the windshield, as is shown in the illustration. The ventilator is made of fine steel, and has a black rubber finish. A set consists of two, and retails at \$1.

NEW APCO SPECIALTY.

Spare Wheel or Demountable Rim Holder for the Running Board, Which Is Locked Automatically.

The Auto Parts Company, Providence, R. I., well-known manufacturer of the Apco line of specialties for the Ford car, is producing a new holder for carrying the extra demountable rim or spare wheel on the running board, where it cannot be splashed with mud. It is sold with the unqualified guarantee of "satisfaction or your money back."

The new holder closely resembles the Apco side tire holder, in that it includes two brackets and an ingenious clasp, which permits of easy and rapid removal or replacement of the spare rim or wheel and locks automatically. The retaining screws are not accessible when the lock is closed.

The holder accurately fits the Ford rim or wheel and



New Apco Spare Wheel or Rim Holder.

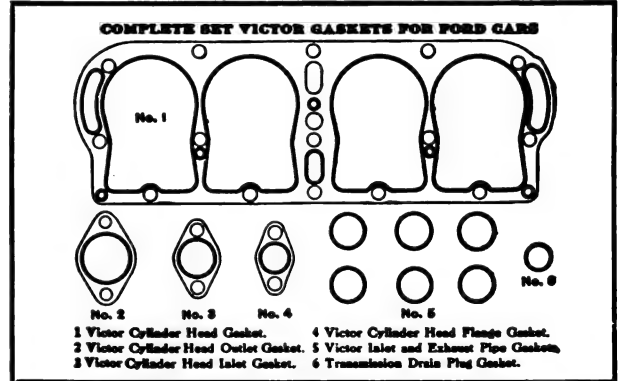
prevents movement and chafing. It is supplied in black enamel and retails at \$2.

VICTOR FORD CAR GASKETS.

Set Complete as Required for Overhauling or Repairing Manufactured to Convenience Owners.

Fitting gaskets is a work that requires considerable experience and skill and while stock can be purchased and the cutting done quickly, the great majority of mo-

torists had best buy the gaskets ready for installation and take no chances. To meet a demand for gaskets that are high-grade and dependable, the Victor Manufacturing Company, Troy and 21st streets, Chicago, Ill., is manufacturing sets of gaskets to fit all makes of pleas-



ure cars, these including all that are necessary for complete replacement in the vent of an overhaul, which it is marketing ready for use. These sets are made to standard dimensions and are guaranteed to be in every way sufficient. These are made from copper faced asbestos and can be used without any preparation. The prices are extremely moderate. The company is producing sets designed especially for Ford cars, which can be purchased direct or through dealers. The company, which claims to be the largest exclusive manufacturer of gaskets in the world, will make estimates from blue prints for jobbers and dealers who desire quantities or special products.

NO KARBON AUTO OIL.

High Quality Lubricants Which Are Recognized as Standards by Motorists Generally.

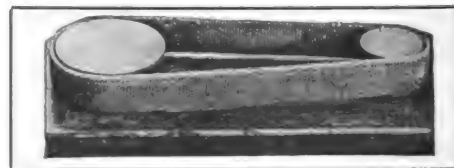
The users of Eagleline oils and greases are increasing as the worth of the lubricants is becoming more generally recognized. This is especially true of No Karbon Auto Oil, the product of the Eagle Oil and Supply Company, 104 Broad street, Boston, Mass. A special refining process has been developed for its production, which eliminates carbonization propensities and induces the motor to give the maximum service and reduces repair bills to the minimum.

Eagleline may be obtained in one, five and 10-gallon quantities, or in 30 and 50-gallon steel drums, fitted with faucets, for which there is no extra charge. The company desires to extend its agencies and is making a special proposition that should interest dealers.

GILMER WOVEN ENDLESS FAN BELTS.

Philadelphia Company Offers Extremely Serviceable Fabric Belts Designed Especially for Ford Motors.

The L. H. Gilmer Company, 52 N. 7th street, Philadelphia, Penn., manufacturer of endless belts and straps for automobiles, is producing woven fabric belts especially



Gilmer Woven Endless Fan Belt.

designed for the Ford motor. As the fan is one of the principal cooling components of the engine, it is necessary that it be kept in motion at all times. The retail price is 40 cents each. All communications should mention this publication.

THE REMY TWELVE-CYLINDER DISTRIBUTOR.

BELIEVING that there will be a demand for 12-cylinder motor cars that will impel the production of motors with 12 cylinders by at least several manufacturers, and being convinced that with the use of these battery and distributor ignition will be the prevailing practise, the Remy Electric Company, Anderson, Ind., has developed a 12-cylinder distributor for use with engines of this type.

The builders of motors of six or more cylinders, which are used with electric starting and lighting systems, have found that the use of distributors instead of magnetos, taking the current from the battery, has lessened complications.

Experimentation has proven that the distribu-

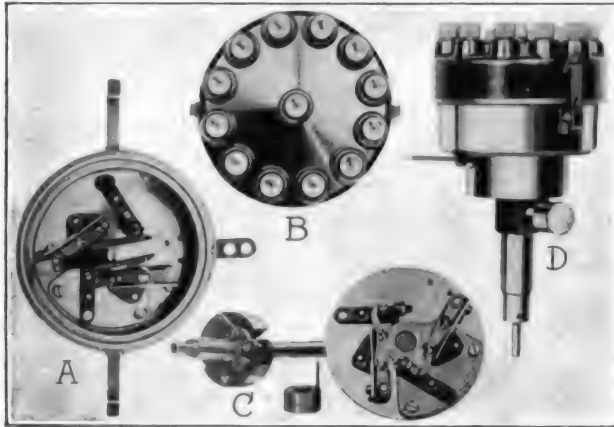
tor must be an extremely accurate relationship between the breakers and the six-pointed cam mounted on the distributor shaft, so that the breaker arms will be lifted alternately, and to obtain this close adjustment the distributor is mounted upon a synchroscope after assembly and each plate carrying a breaker is moved until each breaker is in position to obtain perfect synchronism. When the positions of the breaker arms are found the plates are secured with screws.

Another improvement of merit is the construction of the breaker arms and springs. Stiff, double-leaf flat springs are used to obtain pressure against the fiber blocks that are riveted to the centres of each arm of the contact breakers. Statement is made that this design, together with the light breaker arms, affords a fast, yet smooth breaker action.

Simplicity is the first consideration of the design and the construction is such that the distributor can be disassembled without the use of special tools. Not only this, either automatic or manual spark advance, or both, is practical with this distributor. The number of moving parts has been reduced to minimum. There is no need to disconnect the cables from the distributor to the spark plugs to take off the cap, which is firmly retained by side snaps, as it can be instantly released by exerting pressure upon it. Ample protection is insured the insulation of the system by a safety gap that is incorporated in the Bakelite distributor segment arm.

The large bearing surface for the rotating shaft insures long life for the instrument. This shaft is lubricated by a large grease cup, which will contain sufficient lubricant for a very long period. In fact, statement is made that one filling of grease will be sufficient, no matter how long or continuous the service of the distributor.

A fact of considerable importance is that with this system of ignition but one coil is used. Extreme care is taken in building the coils, each winding being made a soft iron wire core that is heavily insulated to insure against voltage strains. When the windings are completed the coils are saturated with a special compound that will, claim is made, resist any temperature to which they may be exposed. In addition, the windings are further protected by a number of pieces of Bakelite, and when completed the coil is enclosed in a lacquered fiber tube to which Bakelite end pieces are fitted, the case being neat in appearance and affording thorough protection.



The Remy 12-Cylinder Distributor: A, Interior of the Breaker Box Cap, Showing the Two Breaker Arms; B, Exterior of the Breaker Box Cap, Which Carries 12 Terminals; C, Distributor Shaft, Cam and Plate Carrying the Two Breaker Arms; D, the Assembled Instrument.

tor can be perfectly synchronized, and can be utilized with absolute certainty of efficient and effective results. The new Remy 12-cylinder distributor is a departure from former constructions in that two contact breakers are used, both of which are actuated by one accurately finished six-pointed cam.

One breaker is mounted on a steel plate that is concentric with the central line of the distributor and has a boss in which is a hole through which the distributor shaft passes. The second breaker is carried on a smaller plate that is secured to the larger plate by a series of screws. The small plate is collared around the boss, so that all parts move in concentric circles around the central line of the distributor.

Obviously, to obtain accurate timing, there

PRACTICAL FACTS FOR NEW CAR OWNERS.

Five Common Tire Troubles and How to Avoid and Repair Them—Readers' Queries—Suggestions as to Repairs and Operation.

THOUGH the tire builders are constantly advising against the practise of driving the automobile in street car tracks, the majority of operators find it difficult to resist the lure of the smooth running offered. Perhaps if it was more generally understood that deep car tracks ruin tires at a rate all out of proportion to other forms of wear, fewer drivers would yield to the temptation.

The illustration at the top of the group presented on this page is from an actual photograph of a tire that has been run less than 2000 miles and has been driven in car tracks, in road ruts

the fabric is exposed and rapid deterioration sets in.

Equally disastrous effects result from driving in ruts that are not frozen hard enough to support the weight of the car. The frozen flint-like particles gouge the sides of the tire and soon bring ruination. Similar destruction takes place when the driver carelessly scrapes along side curbings.

For a tire as badly worn as the one illustrated there is no practical repair. In some cases, however, if not more than three or more plies of fabric are worn through, repair can sometimes be profitably made by reinforcing the fabric.

The injury illustrated at the lower left of the group is one about which there is more misunderstanding on the part of operators than any other break. To illustrate: The owner may have put the tire, a brand new one, on his car that morning and after a few hours' run it suddenly blew out, without any apparent reason. As a matter of fact, if the owner could only recall it, he ran over a stone about the size of his fist, or jounced over a deep hole, about 50 or 100 miles back. Perhaps he examined the tire at the time and found no marks indicating injury. Nevertheless, the damage was done and the tire started on to its rapid destruction. The tire was slightly deflated below the standard and the fabric, possibly the innermost ply, was bent in the direction opposite to which it was built to bend—and it broke. The edges began to chafe the surrounding fabric, and the break extended until the blowout took place. Or the edges of the break might have pinched the inner tube until it became weakened, permitting the air to escape gradually, resulting in a flat tire.

Stones, ruts and holes should be avoided religiously if the tires are to be preserved. It requires but slight exertion to steer around them, and it often means the saving of dollars. A sectional repair will be required if the break extends more than two inches. Otherwise, an inside repair will be sufficient in most cases.

Poor judgment was shown by the man who placed the inside patch in the casing illustrated at the right. Originally a small cut penetrated



Tires Injured Through Abuse on Part of the Owner—Rut Worn, Stone Bruise and Faulty Patching.

and scraped against street curbings. It is a graphic lesson and carries its own warning. Operated in a proper manner the tire should have endured for 6000 miles at the minimum mileage. In money terms, it means that the owner virtually threw away at the least $66 \frac{2}{3}$ per cent. of the sum he paid for that tire.

When driving in car tracks or ruts the strain and wear falls not on the tread—the thickest part of the tire—but on the side walls, where only a thin layer of rubber protects the fabric. The deeper the track the greater the wear. No tire will stand up long under such treatment before

Tarvia

*Preserves Roads
Prevents Dust-*

A tarviated road invariably means — increased property values and lower road taxes.

MODERN engineers recognize that the automobile has come to stay and they build roads accordingly.

Experience has taught them that ordinary macadam cannot resist motor-car traffic. The rear wheels tear the fine stone loose and the surface blows away in the form of dust.

You have often seen this process of road disintegration. A dusty road always means *the road is wasting away.*

The way to build macadam roads today is to use a powerful binder such as Tarvia, which not only adds greatly to the life of the roadway by making it automobile-proof, but also makes it dustless and mudless.

And of great importance, the reduction in maintenance expenses made possible by this treatment usually *more than pays for the cost of the Tarvia.*

Thousands of miles of roadway have been treated in this way. In fact, some towns have settled down to the policy of building tarviated roads exclusively, wherever possible.

They have done this solely from the standpoint of saving money, because the use of Tarvia means *better roads at lower cost.*

Tarvia is made in three grades to meet varying road conditions.

Illustrated Booklet on request

Special Service Department

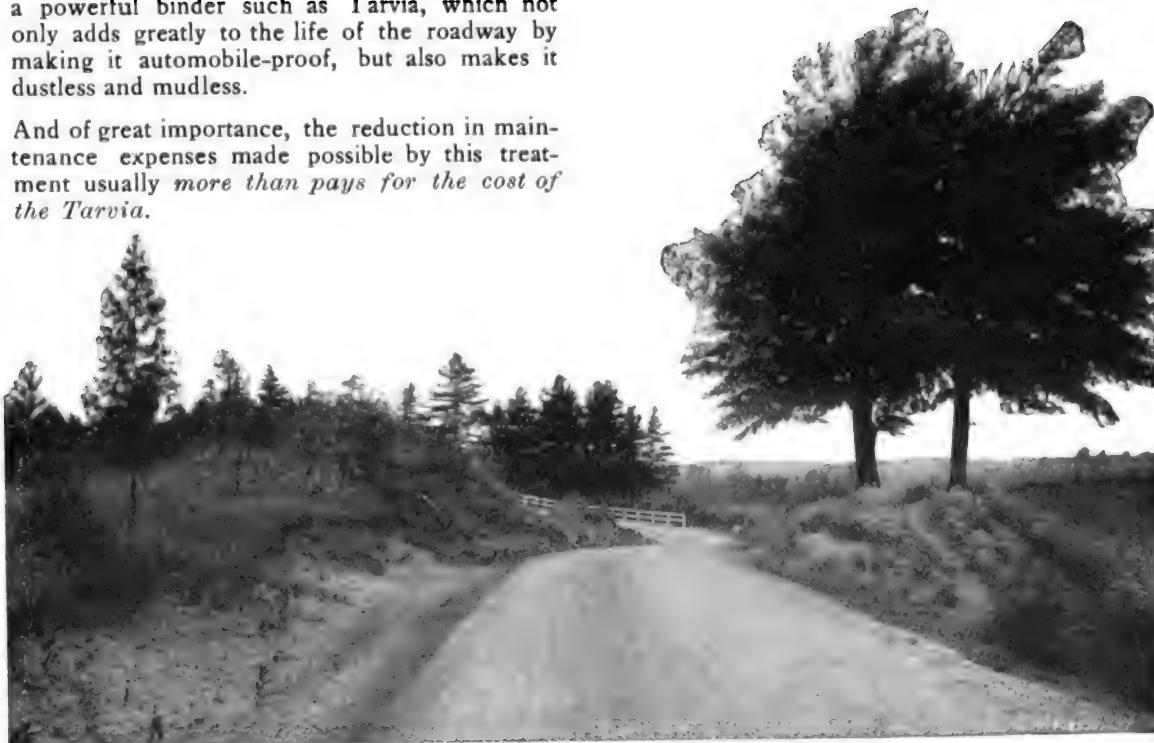
This Company has a corps of trained engineers and chemists who have given years of study to modern road problems.

The advice of these men may be had for the asking by any one interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity the matter will have prompt attention.

BARRETT MANUFACTURING CO.

New York Chicago Philadelphia Boston
St. Louis Cleveland Cincinnati
Pittsburgh Detroit Birmingham Kansas City
Minneapolis Salt Lake City Seattle
The Paterson Mfg. Co., Limited: Montreal Toronto
Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.



Tarviated Road, New York State Highway, Watertown—Carthage. Note the firm, dustless, easy traction surface.

(When Writing to Advertisers Please Mention The Automobile Journal.)

Write for full
particulars



Why Freeze Yourself? Ruin Your Auto

The Superior Safe Garage Heater

SAFE. NO FUMES.
NO GASES

Equipped with pilot light. No
matches, no danger, no discomfort.
An ideal positive heater.

SUPERIOR MANUFACTURING CO. N. S. Pittsburgh, Pa.



SPEDOLENE solves the problem of automobile
and motor truck gear lubrication. One trial
is all we ask. "A fair field and no favor"
will demonstrate to your satisfaction that
SPEDOLENE is the King of all lubricants for
gears.

Henry H. Kroh, Boston Distributor,
MANUFACTURED BY
Continental Asbestos Corporation, Worcester, Mass.

F. SHIRLEY BOYD

175 Massachusetts Ave., Boston, Mass.

R. I. V. Ball Bearings.

Baldwin Chains and Sprockets.

J. H. Sager Line.

20,000

Owners of Pleasure
Cars read each issue of

THE AUTOMOBILE JOURNAL

The Journal circulates in a distinct field and
in the greatest Motor Vehicle and Accessory
market in the world.

Where business can be developed and main-
tained.

Some interesting facts at request.

Automobile Journal Publishing Company
Times Building **Pawtucket, R. I.**

Peerless Quality in Smaller Size

"ALL PURPOSE" FOUR AND SIX
FOUR AT \$2,000 (Sixes \$250 Extra)
THE PEERLESS MOTOR CAR CO., CLEVELAND, OHIO

Makers also of the "48-Six" and Peerless Trucks.
Licensed under The Kardo Patents.

22,500

GUARANTEED

When you have anything to say to those in the auto-
mobile industry use straight trade talk copy in the

Accessory and Garage Journal

The only strictly automobile trade paper published
in America

Automobile Journal Publishing Co.
Publishers

AUTOMOBILE JOURNAL **MOTOR TRUCK**
Times Building, Pawtucket, R. I.

AUTOMOBILE

ELECTRIC LIGHTING SPECIALTIES

For the Automobile Owner and Manufacturer
who wants SERVICE for his money

ELECTRIC LIGHTING SPECIALTIES Made to Order
CULVER-STEARN'S MFG. CO.

Worcester, Mass.

Detroit, Mich.

HOTEL LONGACRE

Broadway & 47th Street

More Like a Club Than a Hotel
Exclusively Bachelor

Convenient to Everything. The refined air and
good service of a club.

RATES PER DAY

50 rooms with lavatory... \$1.00

150 rooms with private bath 1.50

50 rooms with private bath 2.00

Two-room Suites, \$3.00 to \$4.00

Special Weekly Rates

Restaurant a la carte.

Club Breakfasts.

Dining room Open to Ladies.

The best value in New York City
both in rooms and restaurant.

Phone, 7790—Bryant

J. G. BOGGS.

(When Writing to Advertisers Please Mention The Automobile Journal.)

To The Manor Born

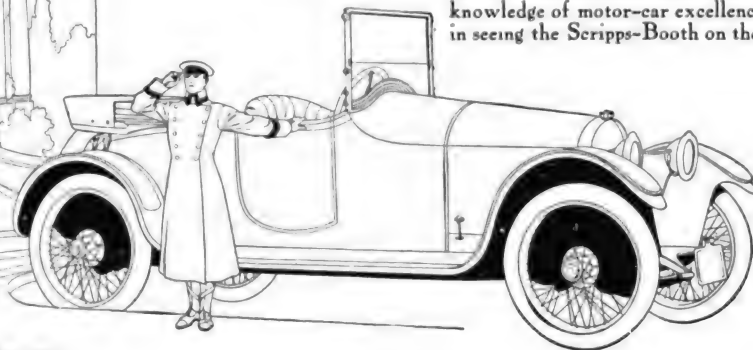


WITH all dignity and road authority, with all beauty and silence of operation, with all the caprices of appointment of the exclusive and expensive large cars, the Scripps-Booth has its unquestioned place in the aristocracy of motordom.

For the first time a light car has been admitted as the social and mechanical equal of the world's largest and highest priced cars.

Owners of these large cars are the ones who are especially appreciative of Scripps-Booth design as giving them their first opportunity to secure in light weight what they have always had in large cars.

Every motorist of consequence and every man based in knowledge of motor-car excellence will be interested in seeing the Scripps-Booth on the nearest salesfloor.



*Scripps-Booth Co.
Detroit, Mich.*

entirely through the shoe, and either through a false idea of economy, or through haste, he placed the patch and resumed his journey in the belief that all was well. At each revolution the pressure forced the patch through the break, wedging apart the fabric from bead to bead until the tire blew out.

Close examination of the illustration will reveal how the patch was pulled away from its original position and was forced through the break. Repair depends upon the seriousness of the break, and the general conditions of the rest of the shoe must determine whether it is possible or good economy to have it mended. The least that can be done is an extensive sectional repair, with fabric reinforcement both inside and out.

READERS' QUERIES.

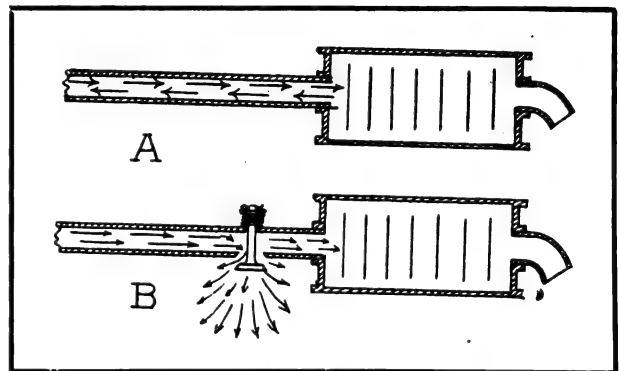
Suggestions to Owners on Effect of Muffler Cut Out, Tight Fitting Pistons, Setting of Gasoline Level on Carburetor and Gearless Differential.

Effect of Muffler Cut Out—B. H. R., Sturgis, Mich.

What effect does the muffler cut out have upon the motor and why have so many states passed statutes forbidding its use?

(When Writing to Advertisers Please Mention The Automobile Journal.)

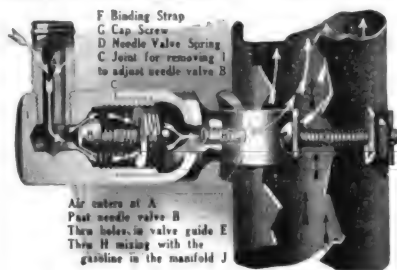
There are many forms of exhaust mufflers, but they do not vary much in principle. They are composed of a number of chambers through which burned gasses from the cylinders must pass. These chambers impede the passage of the gas and it takes some power to force the gas



A. Showing How Some Types of Mufflers Cause Back Pressure; B. Free Expulsion of the Exhaust.

through. The muffler cut out is used to avoid this back pressure. When it is opened the gasses escape into the air without going through the muffler.

Opinions differ widely as to the amount of power absorbed by the muffler, but tests have

Save Gasoline — Get More Power

by attaching the

"SPEED BOOSTER"

to your manifold. Automatically ensures perfect combustion; no waste fuel; no carbon deposits in cylinders; greater power; more speed.

\$2.50

Postpaid or at your dealers.

Your money back if not entirely satisfied.

THE REFLEX IGNITION CO., CLEVELAND, OHIO.

Makers of the famous line of Reflex Spark Plugs.

Why Pay Excessive Hotel Rates?**THE NEW AMSTERDAM**

Euclid Avenue at 22nd Street, CLEVELAND, OHIO

A five minutes walk from the active centres, yet overlooking the most beautiful residence section of Cleveland.

"The logical resting place for tired Tourists."

Large airy suites of from two to five rooms (also single rooms.)

GARAGE NEARBY

RATES:—\$1.50 per day, each person
Dining Room Modified *a la Carte*

A. A. McCASLIN, Managing Director

L. McNAMARA, Manager

Meet me at the
Tuller

New **HOTEL TULLER**
Detroit, Michigan

Center of business on Grand Circus Park. Take Woodward car
get off at Adams Avenue.

ABSOLUTELY FIREPROOF

200 Rooms, Private Bath, \$1.50	Single, \$2.50	Up, Double
200 " " " 2.00	3.00	" "
100 " " " 2.50	4.00	" "
100 " " " 3.00 to 5.00	4.50	" "

Total 600 Outside Rooms. All Absolutely Quiet.
Two Floors—Agents' New Unique Cafes and
Sample Rooms Cabaret Excellence

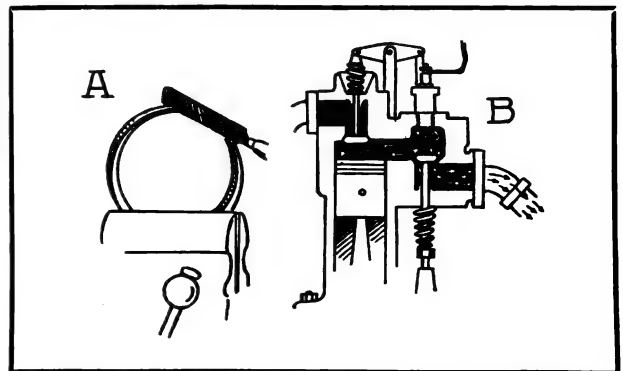
(When Writing to Advertisers Please Mention The Automobile Journal.)

shown it to be so small as to be almost negligible. For that reason some makers have ceased to equip their cars with cut outs. Laws against muffler cut outs have been passed because of the great noise made when the muffler cut out is open and the possibility of frightening horses and causing other accidents. The illustration shows a muffler with and without the cut out.

A Tight Piston—J. H. B., Willows, Cal.

I have always done my own repairing successfully, but now I have trouble which I cannot seem to locate. A few weeks ago I adjusted all the bearings and fitted some oversized rings to the pistons. Ever since the car overheats and occasionally pops back through the carburetor. I have tried several adjustments on the carburetor, but cannot locate the trouble. The motor is exceptionally hard to start and many times I have to open the relief cocks on the cylinder head. This is due to tight bearings no doubt and as I am using an extra large supply of oil I am told that it can do no harm. If you can suggest anything that may be of help to me I shall be very thankful.

You have undoubtedly fitted the piston rings too tightly, leaving an insufficient space at the point of parting. When this condition exists



A, Enlargening Slot by Filing; B, the Sticking of the Intake Valve Allows Popping Back.

overheating will quickly occur on account of the great friction between the wall of the cylinder and the rings. Many times the rings will quickly wear and shape to the cylinders when a large supply of oil is used. But as you say the car has been in this condition for several weeks, it would be best to remove the cylinders and file larger slots in the rings at the point where they come together. Further delay may prove serious to the motor.

It is possible that the hard starting is due to tight bearings. You may have made the adjustment too close, in which case there would be danger of the bearings burning out, no matter how much oil you used. It is more likely, however, that the tight piston rings are the cause of the hard starting also. It would be best to correct that before loosening the bearings. The blowing back through the carburetor is due to the inlet valves not seating properly. There may be pieces

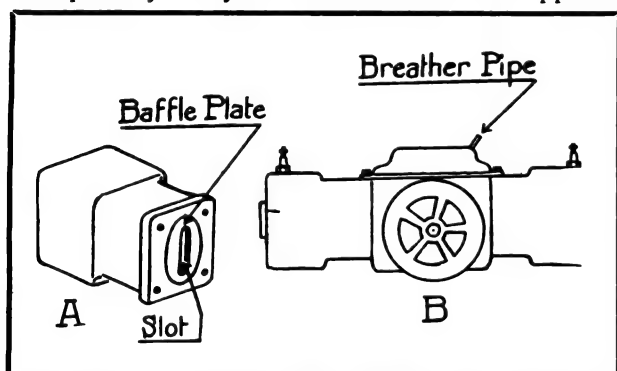
of the grinding compound on the seat or you may have a weak or broken valve spring.

Another condition which would give the same result is a bent valve stem which sticks in the guide. A slow burning mixture will also sometimes cause popping back, as the hot gasses are not fully expelled before the new mixture enters, the result being that the incoming charge is ignited in the intake manifold.

Feeds Too Much Oil—F. L. D., New Orleans, La.

I have a two-cylinder opposed engine which in my opinion feeds too much oil to the pistons. Carbon quickly forms, the plugs become coated and of course the motor skips. I have lowered the oil level as low as I dare and have also tried thicker oils, but the result is about the same. I took the car to a local repair man to be overhauled, but as he met with an accident he was unable to complete the work, so a second party had to be called. The parts were all disassembled and were not marked. Do you think they may have been put together wrong, although this seems to be the only trouble? I have taken it to other repair shops since, but they cannot locate the trouble.

The amount of oil thrown up by the splash system is sometimes more than is needed and this is especially likely to be the case with an opposed



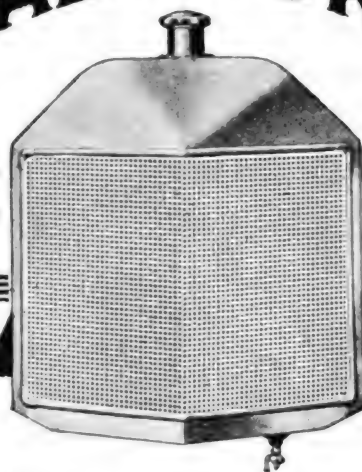
A, Horizontal Opposed Cylinder Fitted With Baffle Plates;
B, Crank Case Cover Fitted With Small Pipe as Breather.

horizontal motor. To overcome the easy access of the oil to horizontal cylinders baffle plates are placed at the ends of the cylinders. The plate forms a complete circle with a slot across it, to provide for the movement of the connecting rod. This slot is seldom more than one-third the area of the interior of the cylinder, so that the amount of oil going in is very much reduced.

If your engine is now fitted with baffle plates it may be advisable that the area of the slots be slightly decreased. Perhaps the scoops at the bottom of the connecting rods dip too deeply into the oil. If so, they can be filed off or the oil level reduced. Determine whether the lubricant does not feed too fast from the oil tank into the crank case. Most types of cars are equipped with a breather pipe for the releasing of the pressure from the crank case. If your car is not so provided it may be well to fit a small pipe to the top of the case.

ROME-TURNEY

EXTENDED FRONT V FORD RADIATORS



**Appearance --- Economy
Endurance**

Greater Power--Least Trouble

A ROME-TURNEY radiator for a Ford car is a necessity, and not a luxury, if the owner wants to obtain the best service, the greatest endurance, full power production and certain reliability.

Perfect tooling will increase power to capacity, will economize gasoline and oil, prolong the life of the motor and insure against mechanical trouble and delays. Every Ford car should be ROME-TURNEY equipped.

ROME-TURNEY Ford car radiators are genuine square tube honeycomb Mercedes type construction, either flat front or V-front types, in polished brass or german silver. Every radiator fully guaranteed.

Write today for prices and information.

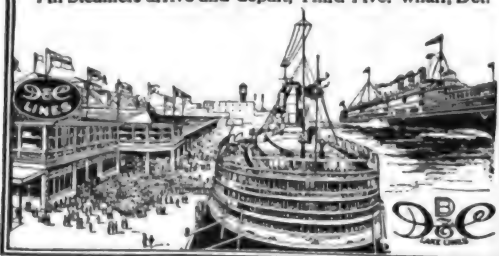
We repair and replace all types of radiators.

Rome-Turney Radiator Co.
105 Canal Street, ROME, N. Y.

THE COAST LINE TO **MACKINAC** DETROIT, TOLEDO, CLEVELAND, BUFFALO, PT. HURON, ALPENA, NIAGARA FALLS, ST. IGNACE.

A LAKE TRIP FOR REST AND RECREATION

Have a real vacation on the Great Lakes, the most enjoyable and economical outing in America. The cool lake breezes, the ever-changing scenes along the shore, and the luxurious steamers of the D. & C. Line are positive guarantees that you will enjoy every minute of your trip, and return home refreshed and glad you went. Daily service between Detroit and Cleveland and Detroit and Buffalo. Four trips weekly from Toledo and Detroit to Mackinac Island and way ports. Two trips weekly, special steamer, Cleveland to Mackinac Island, no stops enroute except Detroit and Alpena. Special day trips between Detroit and Cleveland during July and August. Daily service between Toledo and Put-in-Bay. RAILROAD TICKETS AVAILABLE FOR TRANSPORTATION on D. & C. Steamers between Detroit and Buffalo or Detroit and Cleveland either direction. Send two-cent stamp for illustrated pamphlet and Great Lakes map. Address L. G. Lewis, G.P.A., Detroit, Mich. Detroit & Cleveland Navigation Company Philip H. McMillan, Pres., A. A. Schantz, V.P. & G.M. All Steamers arrive and depart, Third Ave. wharf, Det.



BALL BEARINGS REGROUND
at one-fifth the cost of new, also New Single Row Annular, Thrust, New Departure Double Row and Radax Bearings.

AHLBERG BEARING CO.

Boston Chicago Detroit New York
Los Angeles Cleveland St. Louis, Mo.

VALVOLINE OIL CO.

Heavy, Medium and Light

Automobile Oils

27 STATE STREET BOSTON, MASS.

Mea
MAGNETOS



**S. R. O.
BALL BEARINGS**



Sole Importers

MARBURG BROS., 1790 Broadway, NEW YORK

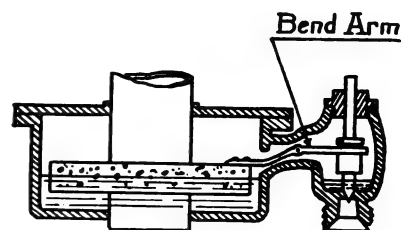
(When Writing to Advertisers Please Mention The Automobile Journal.)

Setting the Gasoline Level—Subscriber, Marietta, O.

I recently took the carburetor of my two-cylinder car apart and cleaned it thoroughly. Ever since it has continued to flood. I have had it apart twice since then, but I cannot seem to find the trouble. My friends tell me that the level is wrong, but as there are no adjustments I do not know how to remedy it. I am doubtful if the level is wrong, as it was all right before I disassembled it. The float is of the cork variety.

It is evident that the level needs correcting, although it is probable that a particle of dirt may have lodged on the valve seat, thereby preventing the needle from shutting off the supply of gasoline. You do not mention the make of the carburetor, therefore, it is impossible to state whether there is really any provision made for an adjustment.

If the carburetor is of the earlier type, it is possible that you may have bent the arm that is attached to the float when disassembling. Disassemble the different parts again and thoroughly clean them. If the cork float is found to be gasoline soaked, it will be necessary to dry it and then apply a few coats of shellac. If this does not remedy the trouble it is almost certain that the level is wrong.



Early Type of Gasoline Chamber, the Level Adjustment Being Made by Bending Arm.

The adjustment on the earlier types is made by bending the arm of the float so that the latter sets lower in the chamber and, of course, is raised quicker by the gasoline. The accompanying illustration shows a leaky carburetor, which has been adjusted by bending the float arm. Care should be taken when bending the arm not to make the level too low. When the level is correctly set, gasoline should be visible at the mouth of the spraying nozzle, but should not flow over.

Gearless Differential—J. Q., Nasonville, R. I.

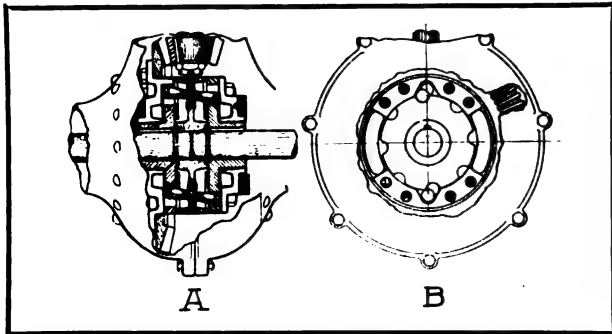
I am a constant reader of your journal and would like to know how the gearless differential made by the Gearless Differential Company of Detroit, operates.

When a vehicle with two wheels at either end of an axle turns a corner the outside wheel must travel further than the inside one, owing to the greater length of the arc over which it travels. In the ordinary differential the small pinion gears fitted to the spider on the inside of the differential

cage apply power to the bevel gear attached to the outside or most rapidly moving wheel, while they rotate on their axes around the bevel gear attached to the inside or slow moving wheel.

The gearless principle is quite the opposite, as it applies all the power to the inside or slow going wheel, while the fastest one is unlatched and permitted to revolve at will. As can be seen in the illustration at A, the left hand differential flange to which the ring gear is attached, the right hand flange, the centre ring retaining the pawls and the right and left driving sectors (two at the top and two at the bottom), are bolted together so that they form the differential cage as a unit. Attached to the end of each shaft and situated in the differential cage is a flange which has eight transverse grooves cut across the periphery into which the pawls fit. The pawls are two round members located on the centre ring and are the interlocking mediums between the driving sectors and the ratchets.

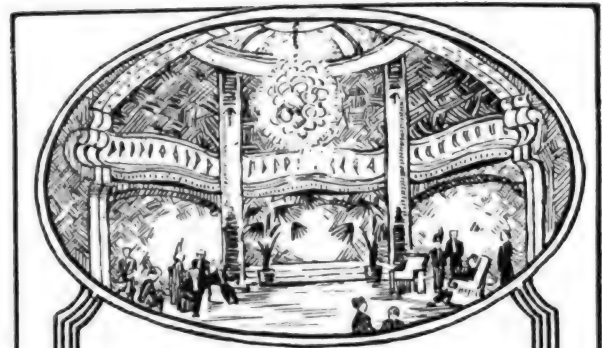
The construction is so designed that when



A. Full View of Gearless Differential, Showing the Several Units; B, Side View Showing Driving Sectors and Flange.

both wheels are being driven equally the right ratchet is engaged by the right end of the top pawl and driven by contact face of the driving sector. The left ratchet is driven in the same manner, the left end of the lower pawl engaging the left ratchet, as seen at B. Under ordinary driving conditions the pawls are kept seated by means of strong coil springs at the centre. In making a turn to the left naturally the right wheel must revolve faster than the left wheel and, therefore, the right ratchet pushes the end of the pawl out of its tooth and remains free to revolve at the necessary speed. The other pawl remains seated in the left ratchet and applies the tractive power through this member to the left wheel. The car is always under control and cannot move faster than the engine speed. When the corner has been turned and both ratchets are revolving at the same speed, the spring forces the right end of the pawl back into engagement with the

(When Writing to Advertisers Please Mention The Automobile Journal.)



Hotel Lenox

EVERY motor tour into New England centres at Boston, and the centre of Boston for the touring motorist is the Hotel Lenox.

Every main highway entering or leaving converges at or diverges from this noted hotel, which is located in the centre of the Back Bay District and close to every attraction that would interest the motorist.

The appointments, conveniences and comforts of the Hotel Lenox are unsurpassed. The cuisine and service will be approved by the most discriminating guest.

Single room with running water, \$2.00 per day.

Single room with private bath, \$2.50 per day and up.

Double room with running water, \$2.50 per day and up.

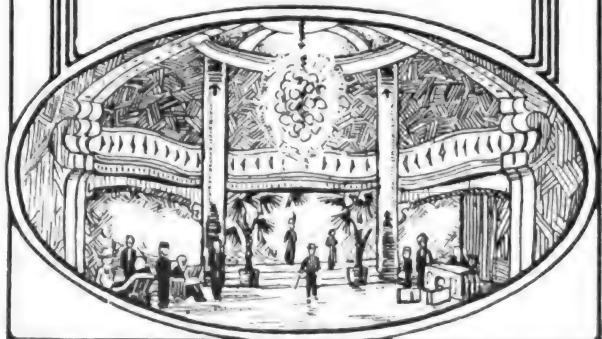
Double room with private bath, \$3.50 per day and up.

Parlor, bedroom and bath, \$8.00 per day and up.

Hotel Lenox

(One Block from Copley Square and Public Library)

Boylston and Exeter Streets
BOSTON, MASS.



HOTEL MAJESTIC

Central Park West at 72nd St.,
New York

Copeland Townsend, formerly Manager of the Hotel Imperial, New York, is now proprietor of the Majestic.

Overlooking Central Park and away from the noise and heat of lower Broadway, the Majestic offers to motorists a haven of quiet and rest after a tedious journey. During the summer season small suites consisting of sitting room, bedroom and bath may be secured at very low prices.

The Cafe Moderne and the roof garden, offer dancing nightly.

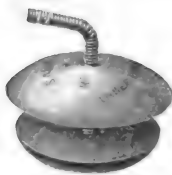
NOTICE FOR OWNERS AND CHAUFFEURS:

Coming into New York via Broadway, or down Fifth Ave., you will find this hotel conveniently located at the 72nd St. entrance to Central Park. A splendid garage just around the corner.

COPELAND TOWNSEND
Managing Director

DIXON'S
GRAPHITE GREASE NO. 677
For Transmissions and Differentials
Graphitizes all bearing surfaces to absolute smoothness. Booklet
No. 210-G.
Made in Jersey City, N. J., by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827 G. 41

SAMPSON
Feather-Edge
INNERTUBE PLUG
No cement—no vulcanizing—no patches.
Guaranteed
STEVENS & CO. 375 Broadway, N. Y.



For Perfect Control and Safe, Comfortable Driving use
Weed Anti-Skid Chains
At all Reputable Dealers
WEED CHAIN TIRE GRIP COMPANY, BRIDGEPORT, CONN.

REXO II \$3⁸⁵

The GARFORD MANUFACTURING COMPANY, 2506 Olive St., ELTRIA, O.
SUCCESSORS TO THE DEAN ELECTRIC COMPANY

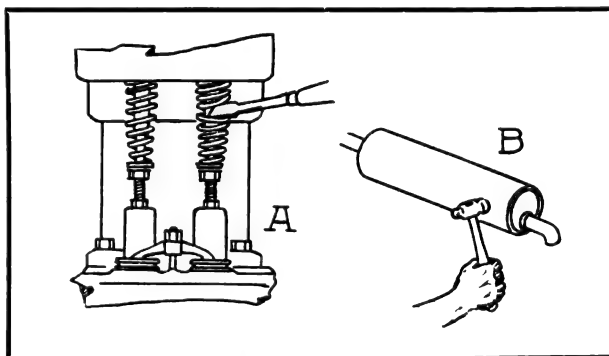
groove in the right ratchet and thus supplies traction to both wheels.

The advantage claimed for this method of transmitting power is that the danger of skidding is greatly reduced. It is also impossible to lose traction on slippery ground, as equal power is always applied to both wheels. Even though one wheel may be on the slippery surface, it will not spin, as the power is supplied to the wheel on solid ground.

Motor Misses at Low Speed—B. L. F., Ardmore, Penn.

I would like to know if you can help me in locating the skip at low speeds on my 1913 ——— touring car. The car was recently placed in good condition by a local repair man and runs fine except for the missing at low speeds. He does not seem to be able to rectify this. The valves have been ground, carbon removed, magnets recharged, carburetor cleaned and set according to the manufacturer's instructions. All joints and caps are tight, as are also the wiring terminals.

One of the spark plugs may be slightly fouled, or the contact points too far apart, in which case the potential of the spark at low speeds is not great enough to overcome this resistance. It may be that one or more valve guides have become so worn that an excess of air is drawn into the com-



A, Method of Testing Weak Spring; B, Cleaning Sooted Muffer by Tapping Sides.

bustion chamber, greatly thinning the mixture, so that it is not combustible. The only remedy for this is to fit new guide bushings if possible, or fill the space with packing.

It is probable that the spring on one of the exhaust valves is weak. When this condition exists and the motor is running at low throttle, the intake stroke of the piston cannot draw in a large amount of mixture, as the throttle is nearly closed and consequently the suction lifts the exhaust valve and draws back some of the burned gases into the cylinder, which forms a mixture not easy to ignite.

The accompanying illustration shows the method of testing the spring. While the motor is running, insert the blade of a screw driver between the coils of the spring, thereby increasing the tension. If the car now runs smoothly, it will

(When Writing to Advertisers Please Mention The Automobile Journal.)

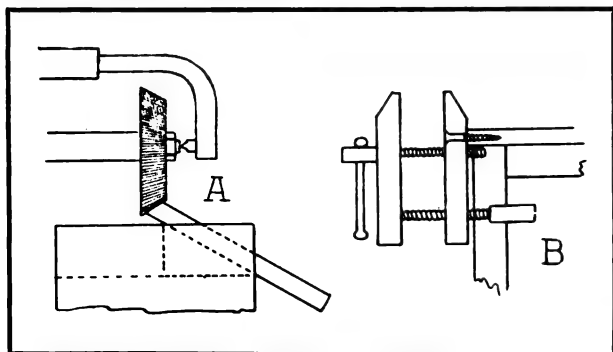
indicate that the spring is weak and that it should be replaced. A temporary repair may be made, however, by stretching the spring.

MILLING BARS AT AN ANGLE.

It is possible to mill the end of a bar at an angle of 60 degrees when only a 30-degree cutter is obtainable. Mill at an angle of 30 degrees a short piece of flat stock which is slightly less in diameter than the object to be machined. Lay this at the bottom of the vise, as shown in Fig. A. The piece to be machined can use the 30-degree surface as a guide and the result will be a surface of 60 degrees. This method can be used whenever it is desired to get an angle twice as large as the cutter was designed to give.

WOOD CLAMP USED AS A VISE.

An ordinary carpenter's wood clamp may be used to good advantage as a vise for holding



A, Milling the End of a Bar at a 90-Degree Angle With a 30-Degree Cutter; B, Wood Clamp Used as Vise.

highly polished or slender articles that might be injured in the ordinary vise. When attachment is to be made at the end of the bench, where no posts interfere, as shown in Fig. B, it can be made fast by a long wood screw running through the jaw of the clamp and into the side of the bench. If it is desired, however, to locate the device at the front of the bench, it will be necessary to drill large clearance holes, posts or side boards to admit the ends of the clamp screws. Additional leverage may be obtained by boring a hole through the shoulder of the hand screw and fitting a handle as illustrated.

CARRYING A SHOVEL CONVENIENTLY.

One of the most useful parts of the car's equipment for cross country touring is a shovel. But to carry it conveniently has puzzled many a car owner. The illustration suggests one practi-

(When Writing to Advertisers Please Mention The Automobile Journal.)



"DON'T GAMBLE WITH SAFETY!"

THE braking efficiency of any car depends wholly on the lining used. Poor brakes are the constant cause of loss of life and property.

Good brake lining—when safety and service are considered—is the cheapest equipment on any car. S-M-C Improved Brake Lining will protect life and property. It is the safety first, last and all the time brake lining.

With S-M-C Improved Brake Lining inefficient brakes are the simplest and easiest of all motor car troubles to overcome. It is heat, water and oil resisting.

Sold by all dealers, with a guarantee that it must accord full service and satisfaction or the purchase price be promptly refunded. Why gamble with safety when you can buy



NEW UNIVERSAL Ford Transmission Lining

Every Ford owner should send today for a trial set of our three transmission linings, cut to the right length and with rivets, ready to attach. Regular price \$.75.

Special for 20 Days \$.50, Postage Prepaid

DEALERS: We desire to place representatives in all sections. We now offer a special protective dealers proposition and will be pleased to give full details at request.

"SOMETHING MOR'N COTTON."

STAYBESTOS MFG. CO.

Germantown, Philadelphia, Pa.

Makers of
Asbestos, Rubber Packings, Gaskets and Radiator Hose

Without Lubrication Your Car Can Be Ruined In a 10 Mile Drive

Metal-to-metal contact positively must be obviated, else wear and ruin quickly result. Experience has proved that a neutral, heavy-bodied, non-fluid MINERAL oil that will cling to the gears and bearings, not decompose nor leak off leaving them unlubricated and unprotected, is positively required.



is the original lubricant of this type. It clings to gears—never fails to provide a durable, pressure-resisting cushion between all contact surfaces—never fails to reduce friction to a minimum—never fails to insure you the use of all the power developed, with the least loss. Hot or cold, wet or dry, its consistency never change—it stays where put and lubricates perfectly to the last small particle.

Get a Can Today and Prove It.



"K. No. 00 Special" grade for sliding gear transmission.

"K. No. 000" for differential, compression cups and all bearings.

Reduced Prices for 1915. Ask Your Dealer.

Avoid Substitutes

New York & New Jersey Lubricant Company

165 Broadway, New York

1430 Michigan Ave., Chicago, Ill.

HAVOLINE OIL

"It Makes a Difference"

Manufacturer: "I am glad to see you have started to sell HAVOLINE OIL."

Garageman: "I found my trade demanded it."

Manufacturer: "That's the result of their oil advertising campaign. The wise motorist insists on HAVOLINE, and we manufacturers know it's best, so we recommend it."

INDIAN REFINING COMPANY
17 Battery Pl. Dept. L. New York



Be sure you sell the oil in the Blue and White Can with the inner seal. We offer the garageman the best package; goods, protection on the market. Write for our Representative or for full information. Be sure and write for the Sales Order.



PROTECTION FROM BREATHING DUST

is of vital importance to Automobile Tourists, especially those subject to Catarrh, Asthma, Hay Fever, Bronchitis, etc.



BREATHE "O-ZEL-O" EN ROUTE

and checkmate the dust germs; "O-ZEL-O" is a combination of anti-septic volatile oils and affords a continuous medicated air bath to the membranes of the head, throat and lungs. The "O-ZEL-O" way is Nature's way and the one sure way to conquer respiratory diseases. It gives you the

advantages of a climate with a rare atmosphere without the disadvantage of being away from home. Physicians and Specialists indorse "O-ZEL-O" as the most agreeable and effective method of treating in a scientific manner diseases of the Breathing Organs. Let us tell you about it. Send your name now.

THE O-ZEL-O COMPANY, Dept. A-54, FORT WAYNE, INDIANA, U.S.A.

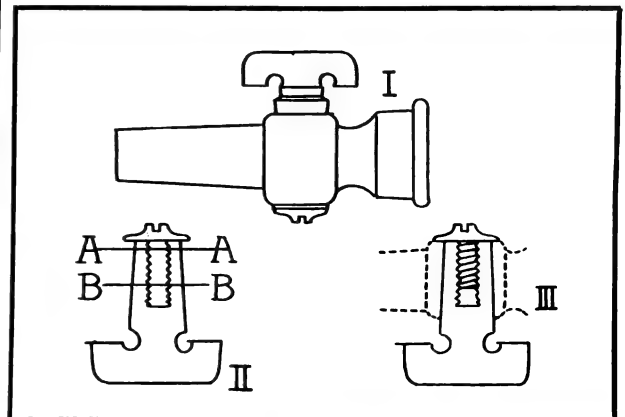
(When Writing to Advertisers Please Mention The Automobile Journal.)

cal method. Cut a slot in the centre of a wooden block, of about six by 12 inches dimensions, wherein to place the point of the shovel. Bolt the block to the running board.

The top of spade can be strapped to any available point—the windshield brace frequently can be used. Other important equipment on long tours are a small axe and a lantern. The former should have a leather sheath, to prevent scratching the paint. For convenience in carrying, the axe may be secured to the lower end of the spade and the lantern to the upper end.

TIGHTENING A WORN STOP COCK.

After much wear or regrinding the plug section of a stop cock may project below the shell, so that the washer and screw cannot draw it tightly into place. This may be remedied by removing the plug from the shell and filing off



Steps Required to Tighten a Worn Stop Cock.

some of the material at the point marked A. A. At the same time an equal amount of material should be removed from the screw on the line marked B. B. When the plug is replaced in the shell it can be drawn down tightly to the screw and washer as shown in Fig. III. Fig. I represents the cock assembled.

STARTING WITHOUT A CRANK.

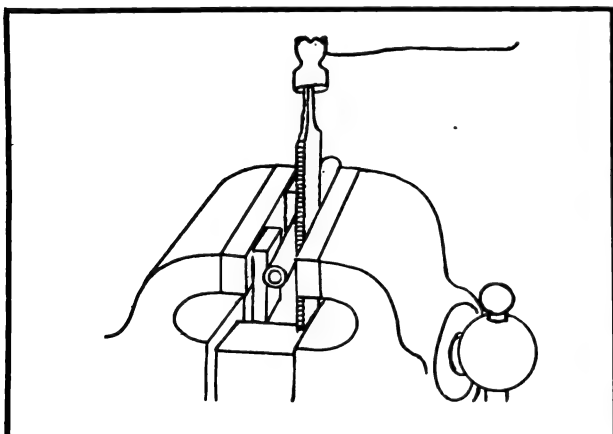
When the crank is detachable from the car it may be lost. On light and medium weight trucks an easy way to start the car without the use of a crank, if this is necessary, is to jack one of the rear wheels, and place the motor in high gear. By turning the jacked wheel forward the motor will be started just as if a crank had been used. The wheel will, of course, spin, but by placing the gear shift lever at neutral after the engine has been started it will stop.

REMOVING CHATTER MARKS.

Uneven chatter marks on work removed from a lathe will prevent its being perfectly true. Sometimes it is impossible to remove these marks, but frequently the following method will be successful. When the cutting tool has been ground with the top rake slanting to the right, change the tool and use one that has the top rake on the left. The cutting edge will strike the chatter marks at right angles and will cut through them instead of having a tendency to follow the old marks. Many times chattering on slender pieces may be reduced if the feed of the cutting tool is slightly increased.

KNURLING WITH A FILE.

A knurled surface on a piece of round stock can be made by the use of a vise, two pieces of flat metal and a sharp file. Grind one side of



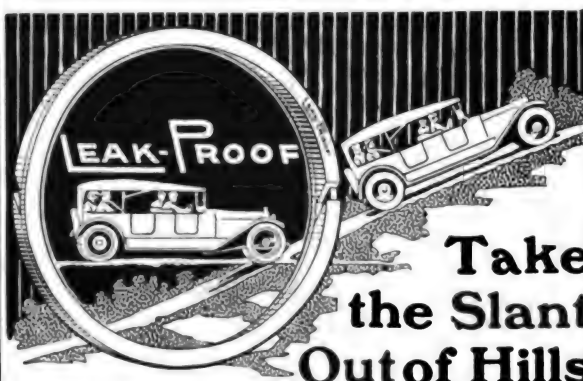
Producing Knurled Surface with File.

the file smooth. Place the parts in the vise as shown in the accompanying illustration. Place the sharp surface of the file against the object to be knurled on the side opposite the square blocks. Strike the file lightly with a hammer at the top. The round piece will roll, receiving the impression of the file. When the square stock is evenly placed it will afford clearance for the knurl, so that it will not be obliterated on the other side by pressure. It is best not to tighten the vise too much at first, but to gradually increase the pressure. Sheet brass jaws used in place of the square stock will give good results.

PRESERVING POLISHED SURFACES.

A highly polished metal surface may be prevented from rusting by the application of a solution made from an ounce of pure beeswax cut in

(When Writing to Advertisers Please Mention The Automobile Journal.)



Those hills your car used to take so easily on high, that now seem to grow steeper every time you try them. Even in second you find it more and more difficult.

The piston rings in your motor are giving out. They are worn and fit badly—they leak compression. You can't get full power with them.

LEAK-PROOF Piston Rings

MADE BY MCQUAY-NORRIS MFG. CO.,

will take the "slant out of the hill" by restoring proper compression and making each fuel charge deliver maximum power.

The two-piece, angle-to-angle interlocking construction of the **LEAK-PROOF** Ring is the only mechanical principle securing equal, firm and sustained bearing on the cylinder wall, while preserving exact fit to piston head. Identify the genuine **LEAK-PROOF** Ring by this exclusive feature. Be sure you get it when you ask for **LEAK-PROOF**

"Ask the User"



Send for Free Booklet
"To Have and to Hold Power"

At all up-to-date Supply Houses, Garages and Repair Shops

McQUAY-NORRIS MFG. CO., Dept. D. ST. LOUIS, U. S. A.

Canadian Factory: W. H. Banfield & Sons, No. 120 Adelaide St., W. Toronto

BRANCH OFFICES

New York—1919-29 B'way at 64th St. Pittsburgh—902 Second Nat. Bank Bldg. Kansas City—513 New Nelson Bldg. Chicago—Suite 718 Michigan Blvd. Bldg. San Francisco—164 Hansford Bldg. Los Angeles—224 Central Bldg. Dallas—509 Juanita Bldg. St. Paul—American Nat. Bank Bldg.

HEINZE



**High Tension
MAGNETO**

HECO

Factories
Lowell,
Mass.

Branch Offices
New York
Detroit

Better
Material
Better
Work-
manship

HECO

Better
Manu-
facturing
facilities

SALES OFFICES
Detroit
Mich.

Branch Offices
Chicago
Minneapolis

HEINZE ELECTRIC COMPANY

Make Heinze the Better Magneto



WHY USE INFERIOR PLUGS WHEN CENTERFIRE

can be bought at the same price? They overcome all Engine troubles, fire where others fail and Add Power to engine. Any length point desired made to order. Try them and you will use them—always. Make a trial and save money. \$1.00 each, 6 for \$5.00.

GUARANTEED

Agents wanted and special prices to dealers.

Milwaukee Auto Specialty Co.
705-707-709-711 Chestnut St., Milwaukee, Wis.

Thermoid

HYDRAULIC COMPRESSED Brake Lining - 100%

THERMOID RUBBER CO., TRENTON, N. J.

TEXACO

MOTOR OIL

American Made for American Trade

**New Departure
Ball Bearings**

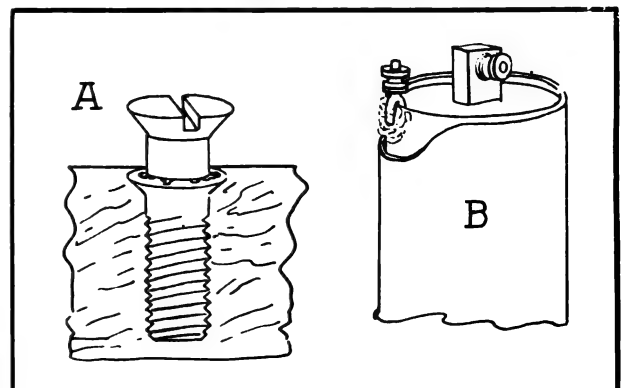
**THE NEW DEPARTURE MFG. COMPANY,
BRISTOL, CONN.**

(When Writing to Advertisers Please Mention The Automobile Journal.)

fine pieces and dissolved in a quart of naphtha or benzine. The bottle should be corked tightly after the ingredients have been put in and allowed to stand for 24 hours. The clear liquid should then be drawn off into another bottle for use. Saturate a small sponge with the fluid and apply as lightly as possible to the surface to be protected. After the parts have thoroughly dried the high polish may be restored by rubbing with clean waste or soft chamois.

REMOVING A BROKEN SCREW.

A broken screw or one that has become so impaired that a screw driver cannot be fitted can sometimes be removed by soldering a good screw onto it. Tin the surface of the broken part with a small soldering iron, being careful not to get solder on anything but the screw. Take another screw slightly larger in diameter than the first. File the end and then tin it after the manner of



A, Method of Removing Broken Screw; B, Repair of Dry Cell.

the first. Solder the two screws together and when the joint is cool they can be removed as one unit with a screw driver. See illustration at A.

When the negative or outside pole of a dry cell is broken off it may pay to repair it. The cardboard cover should be cut away from around the post and the zinc shell where the terminal is attached should be thoroughly cleaned. Coat both the shell and the terminal with soldering acid and solder with a small iron. The repair is illustrated at B.

When the mechanism of the differential becomes so impaired that the rear wheels cannot be turned, the car can always be towed home by removing the keys between the wheels and the driving shafts.

LUBRICATION.

C. W. Stratford, a prominent member of the S. A. E. and a recognized authority on lubrication, recently declared that "the major part of modern motor ills and high maintenance costs can be traced directly to defective methods of lubrication, and to the use of inferior or unsuitable oils."

The experience of others is a fairly safe guide to follow in selecting oil and grease. The following named lubricants have been proven worthy by thousands of operators; they are sold to the consumer in the original containers, which insures the same degree of purity as when it left the refinery, and they can be obtained from dealers in all parts of the country.

Gargoyle Mobiloil.

Gargoyle Mobiloil, which the Vacuum Oil Company produces in four grades to meet the requirements of the different components of the car, is a widely known and widely used lubricant, which has earned a large clientele in all parts of the country through its consistent high average of service. The most advanced refining processes have been adopted to free it of impurities.

Eagleline.

Thousands of users have written letters to the Eagle Oil and Supply Company, indorsing the Eagleline line of lubricants, and especially the No-Karbon Auto Oil. Among the many interesting statements are several which state that no carbon trouble was experienced on cars that used it for more than 15,000 miles.

Harris Oils.

One of the distinguishing features claimed for the oils made by the A. W. Harris Oil Company is that the particular refining processes used eliminate the propensity toward smoking and the likelihood of carbon deposits.

Texas Oils.

The highest possible indorsement of the lubricants produced by the Texas Company is that one of the several grades offered is used by aviators on their motors, which must have an absolutely dependable lubricant. They lubricate perfectly at all times on account of a zero cold test and never deposit a hard carbon crust.

Polarine.

Of Polarine, the product of the Standard Oil Company, which is recognizable in most any garage by the sign bearing the trade name "Socony," it can be said that it is an all-weather lubricant, which retains its body under the highest operating temperatures and is not affected by the coldest weather.

Gear Box Lubricants.

Among the gear box lubricants of merit is the non-fluid oil made by the New York and New Jersey Lubricant Company. This lubricant forms an unusually durable film over the working parts and reduces friction and noise to a minimum.

Differential Grease.

The hard working differential requires a good lubricant that will not leak. The new Dixon product, Graphite Non-Leak Grease No. 680, made by the Joseph Dixon Crucible Company, is especially designed for that purpose and is very efficient. It will not run from the axle ends and is made particularly for differentials that leak.

Supreme Auto Oil.

The Gulf Refining Company has won a large number of adherents, who have found "perfection" in the Supreme Auto Oil. This is produced from a clean and powerful gasoline refined especially for automobile use and is claimed to add to the power of the engine.

Spedolene.

Spedolene, made by the Continental Asbestos Company, is designed especially for gears, transmissions, differentials, worm gears, bearings and timing gears, and is purely a mineral compound that has no erosive action, contains no animal matter, fats, greases, acids, lye, soda or water. It does not run or throw out at the gear cases.

Havoline Oil.

Havoline oil is one of the most widely known and used lubricants on the market today. It is consistent in service and is made from one uniform base crude of tested value by a special process that preserves the molecules of oil, yet frees it entirely from floating carbon and other impurities.

Valvoline Oil.

Valvoline, made by the Valvoline Oil Company, and produced in heavy, medium and light grades, is a high-grade lubricant that leaves but a minimum residue and gives the maximum of horsepower and lubricity.

(When Writing to Advertisers Please Mention The Automobile Journal.)

METZ "25"

The Quality Car

**\$600 Equipped Complete**

INCLUDING Gray & Davis Electric Starter and Electric Lights, Instant One-Man Top, Built-in-Rain-Vision Wind Shield, Bosch High-Tension Magneto, Hyatt Roller Bearings, Speedometer, etc.

"Every Metz car sold sells another one." Write for Dealers' particulars and new catalog "Q."

METZ COMPANY, WALTHAM, MASS.

EISEMANN

The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.

The Eisemann Magneto Company

Sales and General Offices,
32-33d St., Brooklyn, N. Y.

New York, N. Y. Indianapolis, Ind. Detroit, Mich.
123 W. 52nd St. 415 N. Capitol Av. 802 W. d'Av.

**DOVER ELECTRIC LIGHT BULB CASE**

(Pat. Applied For)



It Will Carry Extra Bulbs Safer Than the Ones in the Lamps of the Car.

Send for New 1914 Catalogue

DOVER STAMPING & MFG. CO.,
(1) Cambridge, Mass.

A Complete Library of Automobile Mechanics \$4.75

Transportation Charges Prepaid

Distinct Books—1000 Pages of Text—All Copies Indexed—2000 Illustrations, Including Practical Working Page Charts and Trouble Finders.

Books written by recognized authorities. Especially prepared for those who have to do with the sale, care, repair and operation of motor vehicles, their parts, equipment, accessories, etc.

The practical information in these works cannot be secured through any other series or number of books or for 50 times what is charged for this library.



Engine	35c	Chassis	25c
Magneto	35c	Lighting	50c
Carburetor	35c	Operation	50c
Battery	35c	Overhauling	50c
Tires	25c	Motorcycle	35c
Truck Operation \$1.00			

Automobile Journal Publishing Company

Times Building

Pawtucket, R. I.



SUPERIORITY

In the points that count, through the full range of every day service, the superiority of Zenith performance stands out insistently.

Founded on the basic Compound Nozzle, designed with extreme simplicity, and built for permanent satisfaction, this famous carbureting device has won its leading rank through genuine merit.

The Zenith is Europe's dominant carburetor used on six times more different Chassis than other make. Every nook and corner in the world knows the Zenith and three allied factories in three countries

are necessary to supply the better class of motor vehicles.

The Zenith has no complications. It has no valves or springs or adjustments to develop trouble. It is proof against amateur efforts to correct motor faults. Once properly installed it will last almost forever without attention.

These are a few of the Zenith superiorities you need for better results.

CARBURETOR

Detroit-U.S.A.

"Just Like a Mirror!"



JOHNSON'S PREPARED WAX

is the standard polish for body, hood and fenders. It is quite different from the many liquid polishes on the market—most of which contain acid or oil, and if they do not actually injure the finish—at least remain on the surface sticky and tacky—gathering every bit of dust.

Johnson's Prepared Wax is not a new product—it has been on the market for twenty-five years. It is used every day in thousands of homes for polishing pianos, fine furniture, woodwork and floors. Our cherished reputation stands back of Johnson's Prepared Wax.

Johnson's Prepared Wax cleans, polishes and finishes in one operation. It preserves the varnish and protects it from the weather. It is in paste form—clean and easy to use and economical.

1 pint by Parcel Post 60c—enough for a season's use.

I enclose 10c for a can of Johnson's Prepared Wax—sufficient for one coat on a large car.

Name.....

Address.....

City & State

My Accessory Dealer is..... AJ

Does Not Gather Dust

Johnson's Prepared Wax gives a perfectly hard, dry, glasslike finish that cannot collect dust. It forms a thin, protecting film over the varnish—prevents checking and cracking and

"Sheds Water Like a Duck's Back"

It keeps new cars bright and good looking for an indefinite time—and will make old cars look as well as a coat of paint and varnish. Mud spots can be easily and entirely removed from cars which have been polished with Johnson's Prepared Wax. It imparts a velvety, protecting finish of great beauty and durability. It is impervious to dust, water, scratches, finger prints, etc.

Send us the attached coupon together with 10c and we will forward post-paid a can of Johnson's Prepared Wax—sufficient for one application on a large car.

Agents wanted to sell
Johnson's Prepared Wax.



S. C. JOHNSON & SON
"The Wood Finishing Authorities"
RACINE, WIS.

VOL. XXXIX.

NO. 12.

AUTOMOBILE JOURNAL

\$1.50 the year
10 cents the copy

PAWTUCKET R.I.

July 25, 1915

17% to 22% Lower in Cost per Mile

The following table shows the new comparison of cost per guaranteed mileage—brought about by our action in raising the guarantee basis to 6,000 miles on

VACUUM CUP TIRES

Sizes.	Price Ordinary Non-skid Tires on 3500 Mile Adjustment Basis.	Price V. C. Tires on 6000 Mile Adjustment Basis.	Cost Ordinary Tires per 1000 Miles.	Cost V. C. Tires per 1000 Miles.	V. C. Lower in cost per Mile by
30x3½	\$12.20	\$16.20	\$3.49	\$2.70	22%
34x4	20.35	28.95	5.80	4.52	17%
36x4½	28.70	38.55	8.20	6.42	21%
37x5	33.90	46.85	9.69	7.81	19%

This new guarantee is based on the average mileage established in the Official Endurance Test of *strictly stock* Vacuum Cup Casings by The Automobile Club of America, which recorded an average for these tires of 6,760 miles—three casings scoring over 8,900 miles.

Thus, one of the strongest of the many powerful V.C. sales arguments has been materially broadened and strengthened on actual experience so sound and so authoritative that the dealer may advance it with the most positive assurance.

Pennsylvania Rubber Company, Jeannette, Pa.

*Direct factory branches and service agencies
throughout the United States and Canada*



The Carbon Theory Exploded

When a dealer tells you there is no carbon in his oil, he is either ignorant, or he thinks you are. All oils contain a certain amount of carbon.

The threadbare and overworked theory that the Northern oils produce less carbon has been upset by United States Naval Authority.

Lieut. Bryan, of the United States Navy, an expert on Motor Cylinder Lubrication, has this to say on the carbon question:

"In the absence of any gummy deposit of this kind to cement the free carbon together, the latter will be **blown out through the exhaust**. The oil that will give the best results, then, is not necessarily the one that will **form** the least carbon, but the one that **will form the least carbon in the cylinders**.

"Oils made from the **Southern-asphalt-base crudes** have shown themselves to be much **better adapted** to motor cylinders, as far as their carbon-forming proclivities are concerned than are the paraffine base Pennsylvania oils. The carbon formed from the latter is, as a rule, extremely hard, and clings to the metal surfaces, while that from the former (Southern Oils) is soft, and can easily be wiped off any surface that it is deposited on. This would be expected from a consideration of the hydrocarbons composing the oil, and it has also been demonstrated in practise.

"**The explanation** lies in the fact that the paraffine-base oils are generally composed of the paraffine series of hydro-carbons, while the asphalt-base oils are mainly composed of the ethylene and naphthalene series. One of the characteristics of the latter (Southern Oils) two series, as compared with the paraffine series, is their tendency to distill without decomposition. Consequently, **no gum** will be formed on the cylinder walls, and the carbon liberated will be mostly **discharged with the exhaust gases**."

Lieut. Bryan's address to the Society of Naval Engineers is interesting and instructive. We will be glad to mail a copy on request.

SUPREME AUTO OIL

is manufactured from selected high grade **Southern-asphalt-base Crude Oil**. You may eliminate much of the carbon troubles by using it exclusively.

Look for the Dealers Displaying
the Sign of the Orange Disc.

Gulf Refining Company,

The Largest Independent Refining Company in the World.
Dept. 1870 Frick Annex **PITTSBURGH, PA.**



Now Try It In Your Motor Boat

IF you have tried Texaco Motor Oil in your automobile, you already know the splendid results it gives.

No matter what kind of a motor you use it with, it is always the same with Texaco Motor Oil. Use it on your aeroplane, your motor boat or your automobile. You will have a smooth, easy-running motor. You will get the maximum power. You will get increased mileage. You will be rid of carbon and gumming trouble forever.

Order from the nearby Texaco service station. You can get it in 1 and 5 gallon sealed cans.

Motor Miles should be read by every motorist or owner of a motor boat. Send for your free copy today.

THE TEXAS COMPANY
New York



TEXACO MOTOR OIL

(When Writing to Advertisers Please Mention The Automobile Journal.)

COE'S WRENCHES



UNEQUALLED FOR QUALITY THE WORLD OVER

The wrench is the most used and the most useful tool in a motorist's kit.

COE'S Special Automobile Model is a perfect tool. The jaws are hardened special quality tool steel to withstand hard usage, and the handle is long to afford great leverage. The wrench is thin to work in space inaccessible for ordinary wrenches.

Coe's Special Automobile Model wrench is a tool kit in itself. Coe's quality costs slightly more, and it is worth many times the price of any other tool. A Coe's is always dependable, in the garage or on the road. Literature sent at request.

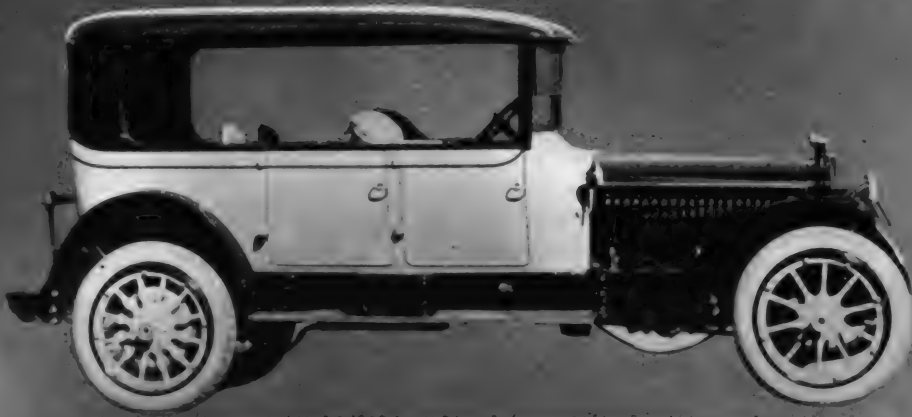
COE'S WRENCH COMPANY WORCESTER, MASS.

Distributors: { J. C. McCarty & Co., 21 Murray Street,
John H. Graham & Co., 113 Chambers Street, } New York City



(When Writing to Advertisers Please Mention The Automobile Journal.)

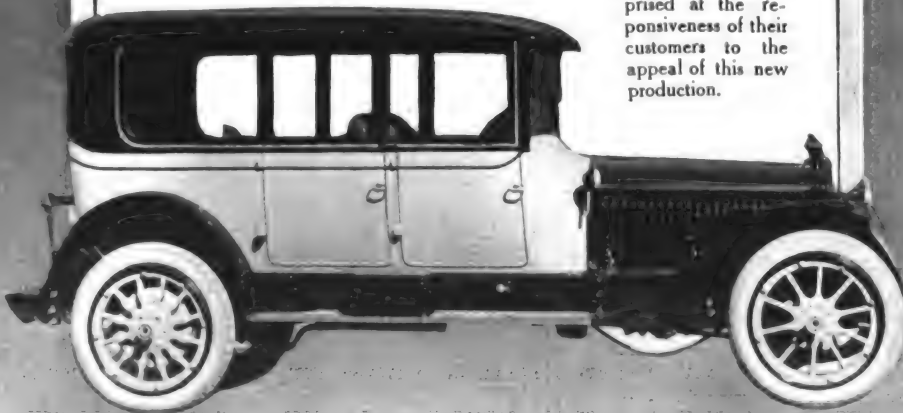
SPRINGFIELD CONVERTIBLE BODIES



THE limousine and the touring car are completely satisfactory only in certain seasons. The new Springfield Demi-Convertible body has no such limitations; it is the all-year, all purpose body.

More and more in America, as in Europe, the tendency is to demand protection from the sun, the dust and sudden showers even in touring. This body with its permanent top provides such protection, while it gives plenty of air and an unobstructed view. It may be converted into a limousine.

Dealers will be surprised at the responsiveness of their customers to the appeal of this new production.



SPRINGFIELD METAL BODY CO.

SPRINGFIELD, MASS.

Index to Advertisers.

	Page	Van Rensselaer Hotel.....	54
Ahlberg Bearing Co.....	56	Weed Chain Tire Grip Co.....	8
Barrett Manufacturing Co.....	54		
Bosch Magneto Co.....	59		
Boyd, F. Shirley.....	54		
Coes Wrench Co.....	2		
Continental Asbestos Corp.....	60		
Culver Stearns Mfg. Co.....	54		
Dixon Crucible Co., Jos.....	58		
Eagle Oil & Supply Co.....	4		
Eisemann Magneto Co.....	63		
Garford Mfg. Co.....	58		
Goodyear Tire & Rubber Co.....	59		
Gulf Refining Co.....	Cover		
Harris Oil Co., A. W.....	56		
Hartford Suspension Co.....	57		
Heinze Electric Co.....	62		
Hotel New Amsterdam.....	63		
Hotel Majestic.....	58		
Hotel Tuller.....	54		
Hotel Van Rensselaer.....	54		
Inter-State Motor Co.....	62		
Johnson, S. C. & Son.....	53		
Majestic Hotel.....	58		
Marburg Bros.....	57		
McQuay-Norris Mfg. Co.....	57		
Mea Magneto Co.....	57		
Mecca Mfg. & Spec. Co.....	4		
Metz Company.....	63		
Michelin Tire Co.....	7		
Motor Parts Co.....	58		
New Amsterdam Hotel.....	63		
New Departure Mfg. Co.....	62		
Nordyke & Marmon.....	62		
N. Y. & N. J. Lubricant Co.....	60		
O-Zel-O Co., The.....	59		
Peerless Motor Car Co.....	54		
Penn. Rubber Co.....	Cover		
Pierce Arrow M. C. Co.....	Cover		
Scripps-Booth Co., The.....	55		
Splittorf Electrical Co.....	57		
Springfield Metal Body Co.....	3		
Standard Oil Co.....	61		
Standard Woven Fabric Co. Cover			
Staybestos Mfg. Co., The.....	58		
Stevens & Co.....	60		
Superior Mfg. Co.....	56		
Texas Oil Co.....	1		
Thermoid Rubber Co.....	62		
Times Square Automobile Co.....	4		
Tuller Hotel.....	54		
Vavoline Oil Co.....	56		
Vanderpool Company, The.....	4		

FOR SALE.

**Shop Vulcanizer, Bargain.
Vanderpool, Springfield, O.**

TIMES SQUARE AUTO CO. WORLD'S LARGEST DEALERS

In Automobiles, Accessories and Supplies.
Selling Prices Lowest in the World. Send
for our Latest Price Wrecker and Save
Money.

TIMES SQUARE AUTO CO.

S. W. Cor. 56th St. & B'way | 1210 Michigan Ave
NEW YORK | CHICAGO

**DEALERS, GARAGE MEN and
AUTOMOBILE AGENTS—**
To make money nowadays you
must buy cheap. We sell supplies
cheaper than any concern in the world.
Send for our latest bargain bulletin.

MECCA MFG. & SPECIALTY CO.

1743 Broadway | 1208 Michigan Ave.
NEW YORK | CHICAGO

Accessory and Garage Journal

A Distinct Trade Publication

Guaranteed to Have an Exclusive
Trade Reader Distribution of

20,000 Copies

Each Monthly Issue

**Without a Competitor
in Its Field**

Detailed Advertising Information
at Request

**Accessory and Garage Journal
Times Building, Pawtucket, R. I.**

IMITATED
BUT NOT
DUPLICATED

**N
O
K
A
R
B
O
N

E
A
G
L
E
I
N
E

A
U
T
O
O
I
L**

**THE OIL THAT SUITS
AND DOES NOT SOOT.**

Carbon in your cylinders means loss
of power. Customers report 10,000
to 15,000 miles with no carbon trou-
bles. A good motto: TRY ANYTHING
ONCE. EAGLEINE NO-KARBON
AUTO OIL is furnished in 1-5-10
gallon, 30 and 50 gallon Steel Drums
with faucets for which no extra charge
is made.

**EAGLE OIL
AND SUPPLY CO.**

104 BROAD STREET, BOSTON, MASS.

The best estimate of number of owners of motor vehicles in the United States is 2,360,000.

These are served by approximately 40,000 industrial and trade interests—those who buy and sell.

Any publication of national distribution devoted to motoring, to the owner, the industry and the trade, with maximum circulation of from 20,000 to 25,000, can reach but a few of any of these classifications in any given section of the country.

Every man engaged in industry or trade directs his endeavors to developing what is the most productive market—in those localities where it can be best promoted and stimulated, and where the returns will be assured. He concentrates his energies because he knows that scatteration is non-productive. He wants an enduring market.

There is no reason why a business man should not concentrate his advertising and promotion where it will be equally productive and certain of production.

The AUTOMOBILE JOURNAL has a distribution of 20,000 in a definite section of the country and to owners. It affords a service that is 100 per cent. in quality and quantity, that has a productiveness for advertising and promotion that cannot be approached, and in the greatest motor vehicle and accessory market of the world.

CONCENTRATION is everything to the advertiser who wants results and a lasting market.

Other Facts at Request.

The Automobile Journal Publishing Company
TIMES BUILDING PAWTUCKET, R. I.

NEW YORK

CHICAGO

BOSTON

DETROIT,

Subscriptions:
The United States and Mexico,
\$1.50 a year; Canada and For-
eign Countries in Postal
Union, \$2.00 a year.
Ten cents a copy.

THE AUTOMOBILE JOURNAL

Remittances:
Should be made by Check, Draft,
Postoffice or Express Money
Order, or Registered Letter.
Money enclosures must
be at sender's risk.

William H. Black, Treasurer.
AUTOMOBILE JOURNAL PUB. CO.

Published the 10th and
25th of Each Month.

D. O. Black, Jr., Secretary.
Times Building, Pawtucket, R. I.

Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under Act of Congress of March 3, 1879.

VOL. XXXIX.

JULY, 25, 1915.

NO. 12.

PUBLISHER'S AND READERS' PAGE.

THOSE Subscribers Who Did Not receive their copy of the Touring Number of The Automobile Journal should notify the publication office at once. Do it today and the remissness will be remedied immediately. This is inspired by the fact that several complaints have been received, and the publisher is confident that every subscriber desires his or her copy of this very exceptional issue. It is more than twice the size of the usual edition, and contains touring data that cannot be obtained in the same completeness and convenient form anywhere else. Write immediately if you did not receive your copy.

Continuing the Editorial Policy of The Automobile Journal, to give the readers the most practical and educational information obtainable, the editor has arranged to present a series of articles which will discuss and explain in a very entertaining and thorough manner the Starting and Lighting systems employed on the majority of automobiles in this country. While it may be taken for granted that the car owner is sufficiently acquainted with the systems to keep them operative under normal conditions, it, nevertheless, is felt that any information imparted by experts that will enable the owner to maintain and adjust and repair those units will be appreciated by all readers. The editors have given considerable thought to this subject and have made exhaustive researches, as well as calling upon the engineers, who build the various systems, for their expert advice. The series is being written by one of the most thoroughly informed writers upon automobile mechanics in this country. The first article will be found to begin on page 15 of this issue.

That the Touring Exchange is meeting the approval and needs of the subscribers is evidenced by the large volume of inquiries, both verbal and written, that come to the Touring Editor. It has been his pleasure to advise a large number of prospective tourists during the past fortnight concerning the routes they had

selected. The touring stories that are appearing regularly in the issues of The Automobile Journal are also striking a responsive chord in hearts in all parts of the country. The latest letter of indorsement comes from Michigan, from a prominent business man. He hastens to say in the first sentence of the letter, "The National Old Trails Road" article in your July 10th issue is of more than passing interest." The balance of the letter is devoted to inquiries concerning particular information about the route. Incidentally, the information was sent to him within one hour after his inquiry was received.

Partial Table of Contents.

	Page
*Dixie Highway Makes Big Start.....	9
*Great Activities in Race Circles.....	13
*Motor Starting and Car Lighting.....	15
*General News of the Industry.....	21
*Herff-Brooks Reduces Prices for 1916..	25
*Great Oil Production Lowers Prices.....	28
*Industrial Happenings and Comments..	30
*Jitneys in Rhode Island's Car Strike....	31
*Willys-Knight Four-Cylinder	33
*Car Accessories and Equipment.....	38
*Practical Motor Car Repairs.....	40
*International Adds New Model.....	43
*Suggestions for the Ford Car Owner....	45
*Ford-LaFrance Motor Chemical Car....	48
*Ford Car Accessories and Equipment..	49
*Practical Facts for New Car Owners....	52

*Indicates article is illustrated.

Another TIB Tour is Scheduled for the next issue of The Automobile Journal, the issue of Aug. 10. It is an incomparable and informative story, relating to a tour through a little known western section, where nature has created some of her most awe inspiring scenery and health giving atmosphere. The writer, J. Harry Minor, president of the Touring Information Bureau of America, is an acknowledged authority upon the subject. His information is gleaned at first hand, he having made the very trips described. The bureau of which he is the head is a unique institution, unique in that it is prepared to give the subscribers of this magazine any special information desired of any section of this country, and most particularly of the West. No charge is made for the service.

A Concrete Example of the value of the suggestions contained in the New Owners' Department is at hand. On page 154 of the July 10 issue of The Automobile Journal is a suggestion to B. L. F. Ardmore, Penn., on how to locate the skip in a motor. Recently, another subscriber called the editor's attention to the fact that this suggestion had more than saved him the cost of a year's subscription, or about \$2, as garage rates prevail in his section, he having once paid that sum for an "elimination trial" and a spring, which, upon examination, proved to be the original spring. It had been repainted and charged as new.

10%

Reduction in Prices

OF

**MICHELIN
TIRES**

EFFECTIVE JULY 19th

One Quality Only—The Best

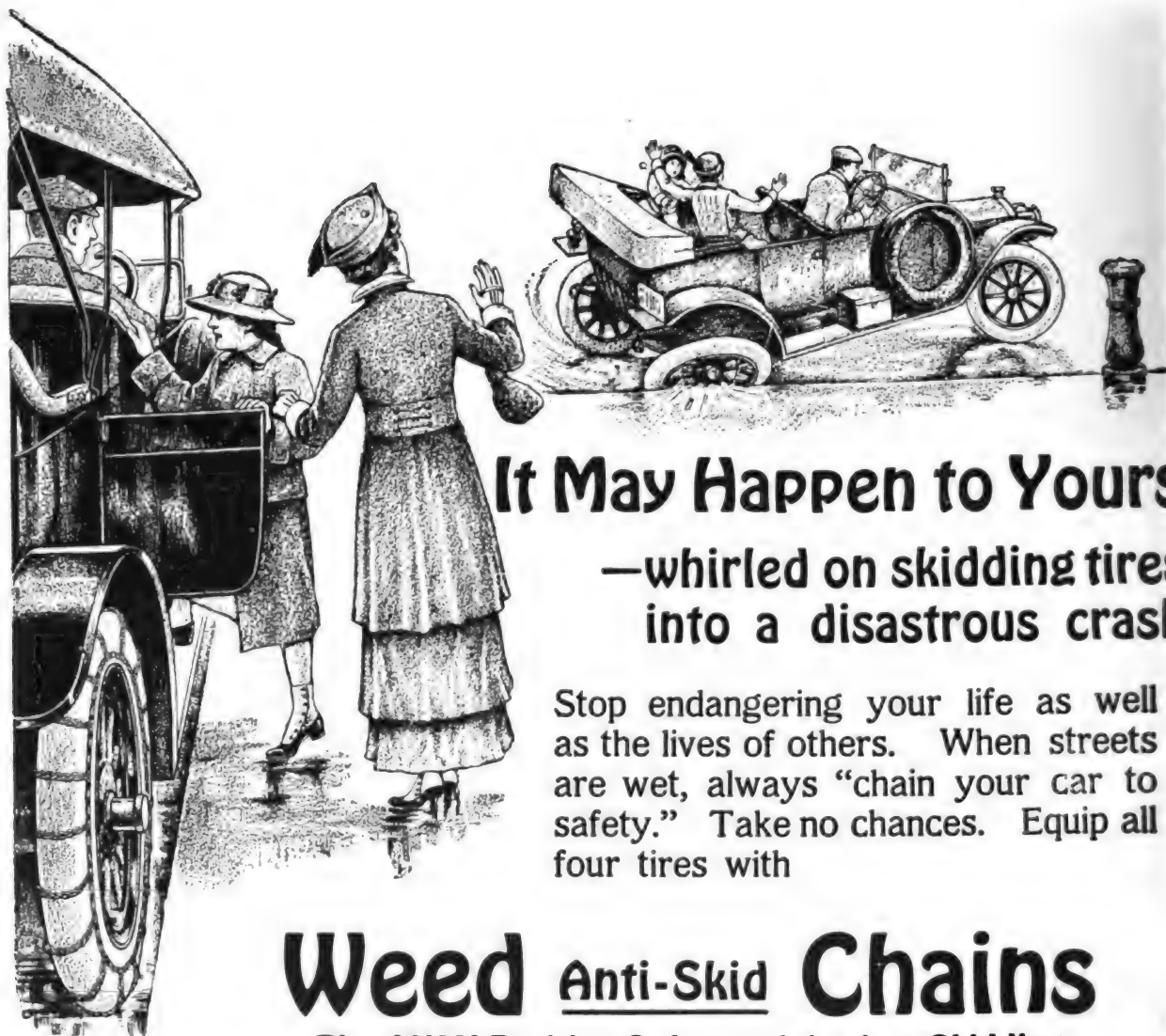
“AS USUAL”

*Get Reduced Prices
from*

**MICHELIN STOCKISTS
EVERYWHERE**



(When Writing to Advertisers Please Mention The Automobile Journal.)



It May Happen to Yours
 —whirled on skidding tires
 into a disastrous crash

Stop endangering your life as well as the lives of others. When streets are wet, always "chain your car to safety." Take no chances. Equip all four tires with

Weed Anti-Skid Chains

The ONLY Positive Safeguard Against Skidding

Safety demands that all tires be equipped with Weed Chains. It doesn't require the gift of second sight to see why this is true. Rubber slips—never grips. It slides on wet pavements and roads like a cake of soap on the moistened hands.

Rubber lacks the bite-and-hang-on ability to prevent skidding, while Weed Chains hold on like a bull dog, prevent side-skid and drive slip. Equip both front and rear tires with Weed Chains. Do it today—before it's too late.

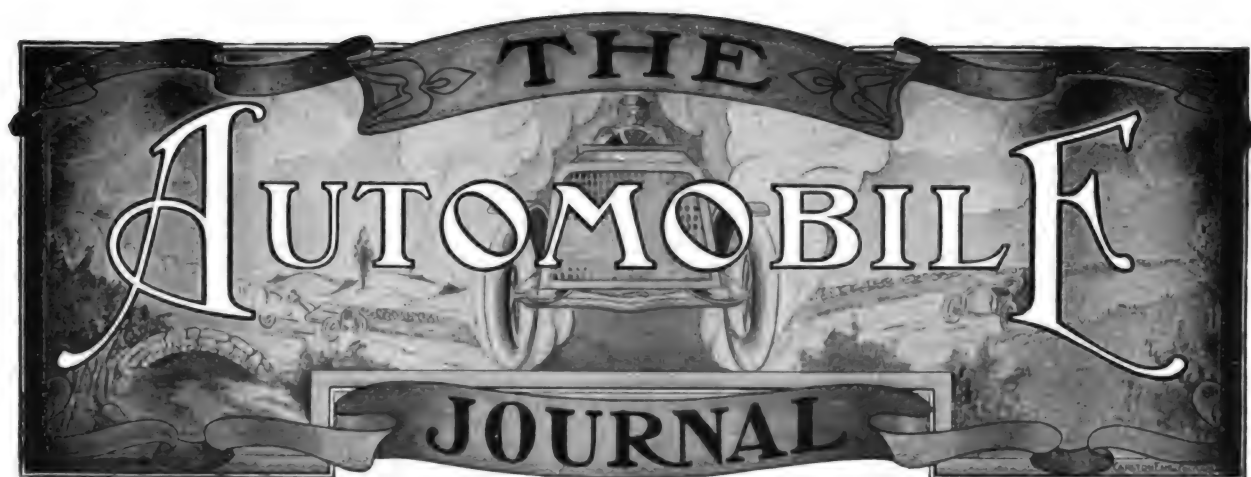
SOLD FOR ALL TIRES BY DEALERS EVERYWHERE

Weed Chain Tire Grip Company, . . . Bridgeport, Conn.

Also manufacturers of Motorcycle Tire Chains and Dobbins Blow-Out Chains



(When Writing to Advertisers Please Mention The Automobile Journal.)



VOL. XXXIX, No. 12

JULY 25, 1915

Price, \$1.50 the Year

DIXIE HIGHWAY MAKES BIG START.

Chief Routes Are Chosen, Officers Selected and \$9,726,000 In Bonds and Taxes Already Pledged for Improvement.

EXCEPTIONAL enthusiasm on the part of all the states through which the Dixie highway is to pass indicates that progress on this great north and south road from the lakes to Florida will be more rapid, if that is possible, than on any of the main touring routes previously mapped and named.

Although the main part of the road from Chicago to Miami was only selected on May 26 and the permanent officers of the association chosen then, nearly \$10,000,000 has already been voted for construction work on the road during the next year in Illinois, Indiana, Kentucky, Tennes-

see, Georgia and Florida, and more is being added every week to that great sum.

As the plan has worked out, the Dixie highway is more accurately described as a system of roads rather than as a single road. Two alternate routes have been planned between Indianapolis and Chattanooga, Chattanooga and Kingston, and Atlanta and Forsyth, Georgia. There are to be feeders north from Chicago along the western shore of Lake Michigan, and a great loop covering the State of Michigan from Chicago to Mackinaw City, and from there through Bay City and Saginaw to Detroit. There will also be



Officials of the Dixie Highway Association—Left to Right, Judge W. M. Allison, President; C. H. Huston, First Vice President; W. R. Long, Secretary and Treasurer, and W. S. Glibbreath, Field Secretary.



Near Murfreesboro, Tenn., in the Blue Grass Region.

an Ohio loop connected with Toledo and Detroit that will touch all the leading cities of that state feeding into the main Dixie highway eastern branch through Dayton and Cincinnati. In Florida the route will be broken into branches to go down both the eastern and western shores, and through the centre of the state. The exact lines to be followed by these feeders and loops has not yet been determined, but the route from Chicago to Miami has been definitely placed.

The routing has in part been determined by the promises of construction to be done on the road during the next year and to assure the carrying out of those promises the Dixie Highway Commission has reserved the right to change the route if the promises are not carried out. A tremendous amount of work is already under way and there is every likelihood that a first class road will be open by the first of next year.

The new highway is regarded as a great pledge of good feeling entered into between the North and South on the semi-centennial of the ending of the great Civil War. The progress of the movement since April 3, when the conference of governors was held to launch it, has demonstrated most vividly the tremendous enthusiasm that has taken hold of the whole country in the interest of good roads. It has shown that the South, which has been in the past con-

sidered indifferent, is now thoroughly awake to the advantages of encouraging automobile traffic through its territory and is prepared to push the good roads movement with an enthusiasm that has seldom been equalled in the northern states.

For the purpose of harnessing the enthusiasm for the project that has swept both North and South, a permanent headquarters for the association has been opened at Chattanooga, Tenn., in the Hamilton National Bank building.

The executive committee of the association in direct charge of the movement consists of Judge M. M. Allison of Tennessee, who is president; W. R. Long, secretary and treasurer; Richard Hardy of Chattanooga, Carl G. Fisher of Indianapolis, Clark Howell of Atlanta, and W. S. Gilbreath, formerly secretary of the Hoosier Motor Club of Indianapolis, is field secretary, and V. L. D. Robinson, formerly secretary of the Chattanooga Motor Club, is assistant secretary in charge of the offices.

Much of the road on the 2593-mile route is already built or in the process of construction, and the bond issues and tax levies already made in the various states through which the route passes are as follows: Illinois, \$3,500,000; Tennessee, \$2,325,000; Florida, \$2,530,400; Kentucky, \$978,000; Georgia, \$159,000; Indiana, \$60,000; Ohio, \$60,000.

In the mountainous districts of Kentucky, where over \$900,000 have been voted for construction on the eastern line of the highway, many contracts have already been let and the work will be generally begun in July. In some cases the work is already in progress. Two Florida counties, Dade and Palm Beach, have pro-



The Dixie Highway in Leon County, Fla.

vided \$1,000,000 for the section of the highway from Miami to the north boundary of Palm Beach county.

Much of the road through all the different states will be built of brick or concrete and will be suitable for all the year around travel.

The country tapped by the highway in Illinois, Michigan, Indiana, Ohio, Kentucky, Tennessee, Georgia and Florida, has an area of 385,762 square miles, in which there is a population of over 25,000,000 and hundreds of thousands of automobiles.

There was tremendous rivalry between the various towns and sections to secure the passage of the highway through their districts and many bitter contests were fought out at the meeting of the organization in Chattanooga during May.

The various routes already selected are as follows:

Chicago to Harvey, crossing the Lincoln highway, to Momence, Watseka, Hoopeston and Danville, all in Illinois, thence to Covington, Ind., Crawfordsville to Indianapolis, and south from Indianapolis by two routes, as follows:

East route—Indianapolis, Cincinnati, Covington, Ky.; Georgetown, Lexington, Richmond, London, Corbin, Barbourville, Pineville, Middlesboro, all in Kentucky; thence to Tazewell, Tenn., Knoxville, Rockwood and Chattanooga.

West route—Indianapolis to Bloomington, Paoli and New Albany, all in Indiana; thence to Louisville, Ky., Elizabethtown, Mammoth Cave, Bowling Green, all in Kentucky; thence Springfield, Tenn., Nashville, Murfreesboro, Shelbyville.



Dixie Highway Near Martinsville, Ind.

Mont Eagle, Chattanooga. The east-and-west routes, having joined at Chattanooga, again take east and west courses as follows in Georgia:

East route—Chattanooga, Dalton, Calhoun and Kingston.

West route—Chattanooga, Lafayette, Summerville, Rome and Kingston.

From Kingston the route is single, via Cartersville and Marietta to Atlanta. From Atlanta the route again takes east and west courses, as follows:

East route—Atlanta, McDonough, Jackson and Forsyth.

West route—Atlanta, Jonesboro, Griffin, Barnesville and Forsyth.

A single route is selected south from Forsyth, as follows: To Macon, Americus, Albany, Thomasville, all in Georgia; thence to Tallahassee, Fla., Live Oak, Lake City, Jacksonville, St. Augustine, Ft. Pierce, Palm Beach to Miami.

The location of the northern loops and feeders to the road has been left to the decision of the state commissioners for the various states through which the road will pass. Carl G. Fisher has been appointed to confer with the Michigan authorities in determining the roads to be followed through Michigan. It was his suggestion that a loop go from Chicago to Mackinaw City via South Bend and Grand Rapids, turning south to Detroit through Bay City. The Michigan commissioners also



Along the Dixie Highway in South Georgia.



Map Showing the Country Through Which the Dixie Highway Will Extend.

undertook to secure the construction of a branch south from Detroit through Toledo to Dayton.

The Dixie Highway Association plans to carry on its work through the aid of county councils organized in each county along the Dixie highway. The vice president of each state has been directed by President Allison to name temporary chairmen in the counties outside of their respective states.

These county councils will select delegates to state conventions when the directors of the Dixie Highway Association will be selected, as their terms constitutionally expire. The membership in the Dixie Highway association, which also includes membership in the various county councils, is divided into three classes. Annual membership is obtained on payment of \$5; the councillor membership, which is a life membership, on payment of \$100; and the founders membership, also for life, on payment of \$1000. Before the work of the association was begun 20 prominent men had each pledged \$1000 to the association as founders. This membership list, which is limited, is rapidly filling up. Receipts from the various classes of members will be used by the association in pushing its propaganda work.

Although the unprecedented number of 5000 substantial citizens of the various states interested attended the meeting of the governors at Chattanooga in April and displayed what experience good roads workers declare to have been entirely unequalled enthusiasm, many thought that the great road mapped out would be "built" only on paper, as thousands of miles of other highways and railroads have been. But enthusiasm for the project has rapidly grown instead of diminishing, and its success seems now practically assured. It has gathered so much momentum that to stop it now would be impossible.

SAFETY FIRST AT REPUBLIC FACTORY.

In a strong campaign to reduce injuries to its employees, the Republic Rubber Company has rearranged much of its machinery and placed mechanical guards about it. It is instructing its employees in methods that are calculated to avoid accident and it maintains an efficient hospital with two doctors and a nurse to give first aid to men who are injured. Under the workingmen's compensation law in Ohio two-thirds of the pay of a man is received when he is laid up by injuries after the first week, but nothing is given for the first week. This is designed to prevent intentional injuries.

GREAT ACTIVITIES IN RACE CIRCLES.

NEW speedways are projected for Providence, Philadelphia and Pittsburg, several other events on existing tracks during the fall are planned, the Maxwell team has withdrawn from racing and some of the Stutz cars have been leased to outside drivers. These are the principal points of interest in two weeks great activity in the racing world.

The Philadelphia track, which is already under construction, will rival in costliness the new Chicago and Sheepshead Bay plants. It is said that \$2,000,000 will be spent in building it. Steam shovels are already at work excavating on the site, which is 16 miles north of the city, between the Philadelphia and Reading railroad and the Old York road north of Willow Grove park.

The track is to be two miles long, with a surface of brick laid on a concrete foundation. Concrete curbs hub-high will be built at both sides to prevent drivers skidding off. Subways under the track will allow the crowd to cross during a race. Space will be provided for parking 30,000 automobiles and seats will be supplied for 100,000 people.

Pittsburg has organized a speedway association with a capital of \$1,100,000. There are 2000 memberships and most of these are said to have been sold already. The track will be built on the most modern plan based on a study of existing tracks. Sites are now being examined.

The men who are backing the project are F. J. Kress, president of the Kress Box Company and of the Franklin Savings and Trust Company, who is also president of the Speedway association. H. C. Fry and Ralph D. Ward are vice presidents. J. Numa Nordy is the general manager and fiscal agent of the association.

Entry blanks have been issued for the first race on the Twin City Motor Speedway, midway between St. Paul and Minneapolis, Sept. 4. Concrete laying on the track began early in July and it will be completed in a month. Elimination trials will be held Aug. 28-31. A speed of 80 miles per hour will be required. The management objects to the designation of the track as the Min-

neapolis speedway, as it is midway between the two cities and as much a St. Paul undertaking as it is Minneapolis.

It has been announced that the Maxwell racing team will be discontinued Aug. 1 and that the factory will not enter cars in any races after that time. Whether the present racing cars will be sold or leased to drivers for entry is not known. Results this season have not been satisfactory to Walter E. Flanders and the death of Billy Carlson and his mechanic at Tacoma was the last straw.

Ralph De Palma has leased the Stutz car driven by Howdy Wilcox at Indianapolis and has entered it in the Elgin road races. He will have



The Big Baked Potato Special Entered in the Tacoma Speedway Races by the Northern Pacific Railway.

a team of three cars there—two Mercedes, driven by himself and Caleb Bragg. The driver of the Stutz has not yet been named. De Palma drove the Stutz at Saginaw early in the month, winning six races with it.

This does not, however, forecast the withdrawal of the Stutz team from racing. Earl Cooper is said to lease his car from the company on the same plan as De Palma. The company furnishes the car and all spare parts, while the driver keeps the prize money and pays the racing expenses. The company will continue to enter its cars as before in the leading events.

Barney Oldfield expects to get back in the lime light soon with one of the Grand Prize De-lage's which he has bought in France and which is being shipped to him.

Eliminations at Sheepshead Bay.

Elimination trials for the Sheepshead Bay 350 miles race, Oct. 2, have been set for Sept. 24 to 27, and a speed of 85 miles will be required. Thirty-two cars will be started if possible and this is thought to be easy in view of the new ruling of the A. A. A. contest board, which will permit five cars of each make to compete. The more finished condition of the New York track and the parbola banking in place of the straight banking that is used at Chicago, are expected to result in speeds around 100 miles per hour. The race will be for 350 miles instead of for 500. The \$50,000 prize money will be divided into 12 prizes, ranging from \$20,000 to \$500.

The management of the Chicago speedway has consented, at the request of Everard Thompson of the Sheepshead Bay track, to postpone its fall race from Sept. 18 to Oct. 16. The management of the New York track was afraid that if the race was run just before its own many entries might be lost through cars not being in condition.

The present arrangement will permit a thorough test of the comparative speed possibilities of the two tracks, as the Chicago race will also be for 350 miles. A 100-mile invitation race Sunday, Aug. 8, is planned at Chicago, in which Dario Resta, Ralph De Palma, Barney Oldfield and Earl Cooper will be asked to compete.

There is a movement on in El Paso to secure a sanction for a motor race on the Jaurez horse track the last week in September. Purses of \$3000 would be offered for three days racing. The date is so close to that of the Sheepshead Bay event that the leading drivers could probably not attend.

New Racing Plant at Providence.

Narragansett Park, Providence, R. I., which was long well known as a horse racing track, has been transformed at a cost of \$225,000 into an automobile racing speedway. The new track is a mile long, surfaced with asphalt, and banked steeply at the turns.

It was built by Fredrick E. Perkins after a careful study of similar tracks in Europe, and the results obtained upon it will be of great interest to all automobile racing men. It will be the only asphalt track in the country.

The first race upon it will be held Sept. 18, when a 100-mile event will be run for \$10,000. Sanction for this has been granted by the A. A. A. Non-stock cars of up to 300-inch piston displacement will be used and weight is limited to 2500 pounds. Fourteen starters are permitted and in the elimination trials these must make 70 miles an hour in two laps over the track. There will

be also a one-hour motorcycle race for professional riders with machines in the 61 cubic inches class. The prize is \$1000 and 20 will be permitted to compete. In addition to these two races there will be an amateur automobile race for the speedway cup of 25 miles.

The width of the track is 75 to 81 feet, reaching its maximum width on the home stretch. It is banked from four to six per cent. all the way round, with banks on the turns of from 10 to 31 per cent.

The top surface is a special asphalt compound which, it is claimed, will not bleed or ooze, nor will it crack or distend. The smooth surface of the asphalt does away with most of the vibration that is caused by brick or wood surfaced speedways, and is expected to permit speeds that are unprecedented on a one-mile track.

MICHELIN TIRE PRICES REDUCED.

Announcement of great importance to tire users is that the Michelin Tire Company, Milltown, N. J., has made a reduction of 10 per cent. in the prices of all types of its tires. Increased production and highly efficient facilities for manufacture are given as the prime causes for the reduction—the high quality of Michelin tires will not be altered.

The company has experienced a large demand for its product from England and France, which countries have been unable to satisfy their war needs with the local production.

GOODYEARS IN ECONOMY TEST.

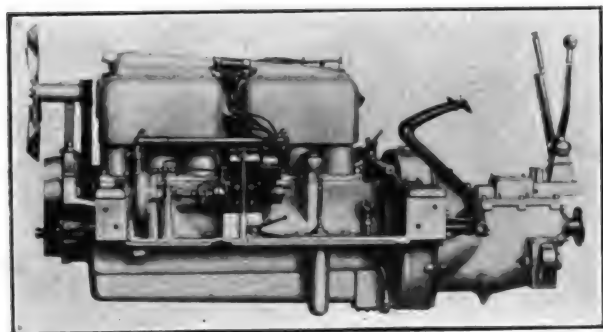
When 105 Saxon Sixes were driven away from the Detroit factory by dealers in a great drive-away day recently, they were all equipped with Goodyear tires. The purpose of the drive was to establish an economy record for ordinary cross country driving. Reports of performance from each dealer will be received and tabulated, and prizes will be given the men who made the best showing. The drive began in a rain and much mud was encountered. In spite of these adverse conditions a good record is expected.

The Touring Information Bureau of Kansas City has written officials of all local motoring clubs encouraging members to apply to it for road, hotel and garage information. It offers each club a copy of a splendid three-color wall map of the United States to be hung in the club rooms. It is free. The third edition of the Tib route book is now being circulated.

MOTOR STARTING AND CAR LIGHTING.

Principles of the Different Electrical Units and the Systems Now In General Use and Characteristics of Manually Operated and Mechanical Equipment.

MOTOR cranking by mechanical means is, in the minds of the great majority of motorists, absolutely necessary. Engine starters are



Left Side of Engine with Three-Unit Electric System, Showing the Magneto.

included in the standard equipment of the machines produced by a majority of automobile manufacturers, and aside from one popular make comparatively few pleasure cars are built that are not either equipped with starters or adapted for their installation if the purchasers desire.

Manual engine cranking is not necessarily an exertion if the driver is experienced, the temperature is not low, the motor and its auxiliaries are functioning normally and the motor not of large size, but with the increase of engine dimensions, and if for any reason the carburetion, ignition and lubrication systems are not at standard efficiency, starting may require hard labor. To crank an engine by hand the driver must go into the street (provided the machine is outside a garage), with the probability of stepping in mud, water or snow in the event of storm, conditions that sometimes are decidedly discomforting.

In extreme heat cranking quickly becomes severe work. If the engine is stopped the driver must leave his seat to use the crank. When not equipped with a starter the driver will run the engine rather than stop it, which considerably increases the consumption of fuel and oil if stops are frequent.

All Engine Starters Mechanical.

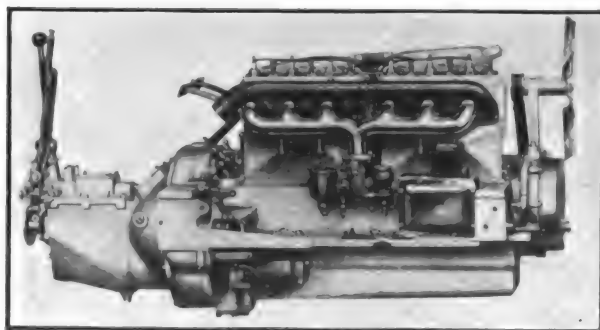
All engine starters are mechanical, and these may be differentiated into two general classifica-

tions, those that are operated manually, either by hand levers or foot pedals, and those that are operated by springs, compressed air or electric energy. The use of gas forced into the engine cylinders under pressure has been attempted, but this type has never been regarded as successful, because a motor will not have sufficient compression to cause dependable firing, and none is in general use.

The manually operated starters have as a rule been devised for installation in cheap chassis and are not adapted for use in machines having motors of medium or large size. These are constructed with linkage so compounded that movement of the lever or hand will turn the engine over against compression with comparatively little exertion, and these are generally efficient for work required of them. The chief recommendation is the small cost. Some of these are well built and enduring and do not detract from the appearance of the vehicles, and they serve a very useful purpose.

Spring and Air Pressure Systems.

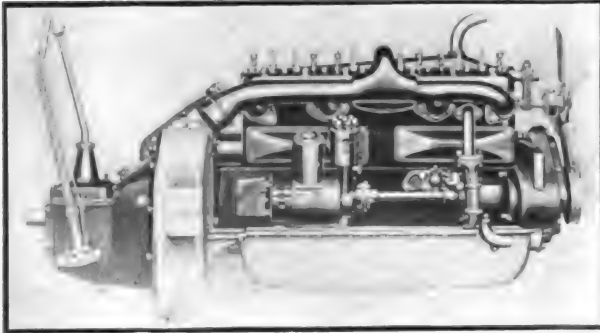
Spring operated starters are comparatively few. Because of the size of the spring and that the device must be located at the forward end of the crankshaft, these are not specially favored, although their usefulness is well established. The principal objection is the appearance. Some of



Right Side of Engine with Three-Unit Electric System, Showing Generator and Motor.

these are constructed so that the turning of the engine will rewind the spring in readiness for the succeeding start.

Several systems are constructed to be operated by compressed air, either admitting the air into the engine cylinders at pressure sufficient to



Right Side of Engine with Two-Unit Electric System, Showing Generator-Distributor Unit.

cause it to turn until firing is begun, or driving an air motor coupled to the forward end of the crankshaft. In either of these the system must include a tank in which the air is compressed, and a compressor that will maintain sufficient pressure for any normal requirement.

Electric Systems Are Many.

The great majority of pleasure cars are equipped with starters operated by electric current supplied from a small storage battery, and this class may be said to consist of three general types. These are the starter system that consists of a dynamo or generator that will charge a battery and so constructed that when required it will serve as a motor and, with current drawn from the battery it has charged, turn the engine until the cylinders fire regularly; the system that consists of a separate dynamo to charge a battery and a separate motor to turn the engine; the system that consists of the same units as previously stated and a magneto; the system that consists of either the first or the second units stated and either a magneto or igniter, the current for ignition being either taken from the magneto or from the battery.

When the dynamo, starting motor and magneto or igniter are combined in one unit this is said to be a single or combined unit system. When the dynamo and the starting motor are combined and the magneto is separate, or when the dynamo and igniter are combined and the starting motor is separate, either is said to be the two-unit system. When the dynamo, the starting motor and the magneto or distributor are all separate, this is said to be the three or separate unit system.

Basis of All the Storage Battery.

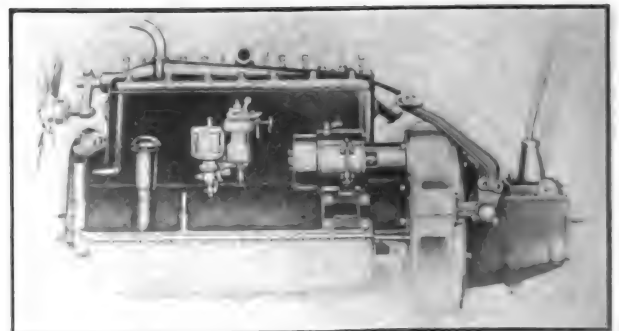
The basic principle of all electric systems is

the use of a battery of cells that may be charged by a dynamo or generator by the gasoline engine while it is driving the car or idling, and which may be drawn upon for a considerable current for a brief period to start the engine, and which will also supply current for lighting or ignition, or both. The use of a dynamo is practical to generate current, and this can be drawn upon so long as the dynamo is in operation, but when it is stopped the current stops and if there is need for current while the dynamo is idle it must be stored so that it can be utilized during the period the dynamo is not operated.

Assuming instances: The battery of dry cells will furnish current for ignition until it is exhausted, but as the cells cannot be recharged they must be eventually replaced, and as the cells deteriorate with use the voltage and amperage will gradually fail. The battery will have its greatest capacity when new, when the spark will be at maximum, for the voltage will be high, and as the potency of the cells are diminished the ignition current will be reduced until the point is reached when it will no longer jump a gap between the electrodes of a spark plug. The dry cell battery is not adapted for lighting, because the cells are not designed for constant service and a short circuit or an excessive load will cause heating, and in any event the life is comparatively short.

Can Renew Battery Efficiency.

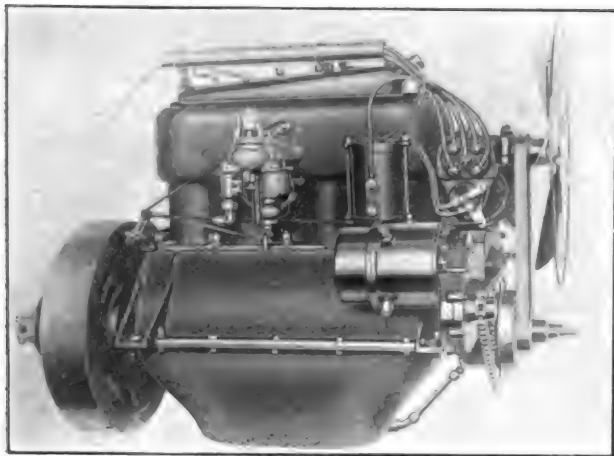
The storage battery, so-called, will supply current satisfactorily until it is exhausted and its potency can be renewed by charging, but time is required for restoring capacity and special apparatus is necessary. The period of service depends upon the size of the battery and the demand upon it, but obviously charging must be done at frequent intervals, and while being



Left Side of Engine with Two-Unit Electric System, Showing Starting Motor.

charged the battery cannot be used. These conditions impelled the use of the magneto, which is a type of generator which will create a current

that will increase in intensity with the number of revolutions and which is available so long as the machine is operated. But being driven by the



Right Side of Engine with Three-Unit Electric System, Showing Distributor and Starting Motor.

motor it is evident that it is not available for any other purpose than supplying current to the engine.

Two Types of Magnetos.

Magnetos are of two types, the low-tension, in which a current of low voltage is created and which is intensified by a transformer coil to a higher voltage, and which can be brought to any desired voltage, and the high-tension, in which the current is created at given voltages and sent direct to the spark plugs. The magneto will develop a comparatively low voltage at slow speeds and frequently not sufficient for ignition purposes, and generally installations of this character are made with connection with either a battery of dry cells or a battery of storage cells, which will furnish current until the magneto has developed sufficient voltage to fire the charges of gas. Then the current from the magneto is switched to the circuit and the battery is no longer drawn upon until the engine is again stopped. With such a system the battery can be used as a current supply in the event of failure of the magneto.

Developments from Dry Cells.

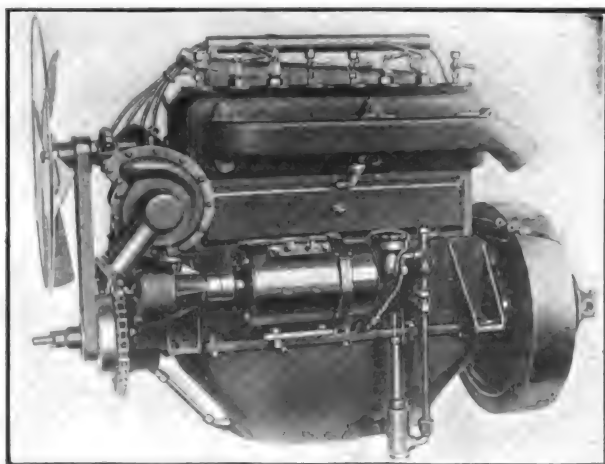
Dry cells were first used for ignition because of their convenience, but their limited capacity directed attention toward the longer enduring storage batteries, and then the magneto was developed. The adaptations for the uses of batteries and magnetos for firing the engine are exceedingly numerous, and some afford exceptional service for certain purposes, but the limitations soon turned electrical engineers to the develop-

ment of equipment that would be more serviceable. By this is meant that dry cell and storage batteries with timers and distributors, and low and high-tension magnetos with distributors, served for ignition requirements generally.

With the demand for improved lighting the next step beyond the dry cell or storage battery used for engine ignition was increasing the size of the storage battery and using it for both purposes, but frequent charging was necessary, else a battery of very large proportions, necessarily weighty and costly, must be installed. Both of these conditions were prohibitive, especially where one of the chief objects of the designer is to make the vehicle as light as possible. Then the installation of a small dynamo which would charge a storage battery, from which current could be drawn both for lighting and ignition, was conceived and made practical. In some instances this equipment was used with a magneto, the dynamo charging the battery only, the battery being used for starting ignition as well as lighting. This equipment was soon perfected with governing or regulating devices, which either cut off or reduced the current when the battery was charged, and as the voltage was diminished closed the circuit, so that charging was resumed.

Small Dynamo and Battery.

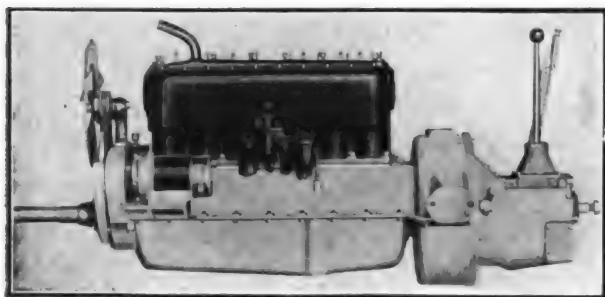
The dynamo was in every instance a direct current type of small capacity, and the battery was usually of eight to 12 volts. This equipment was the basis of the systems that are now the vogue with practically all pleasure cars, save those of very cheap price. With a motor that



Left Side of Engine with Three-Unit Electric System, Showing Generator.

could be engaged with mechanism to turn the engine whenever required, and a dynamo to charge the battery, lighting and starting was pro-

vided for, and with a constant current supply the next step was to use a distributor with current from the battery for ignition, having batteries



Left Side of Motor with Two-Unit Electric System. Showing Motor Starter Driving Through Timing Gears.

with sufficient capacity to insure whatever reserve might be considered during periods the engine was not in operation.

Dynamo Electrically Defined.

The term dynamo may be applied to a machine that is either a generator or a motor. A motor may be driven as a generator or a generator used as a motor. If the power is taken from the outside source and used to drive the machine, it is a motor, and in automobile installations the motor is driven by current supplied by the storage battery. But if the machine is driven by mechanical power, either an engine or a motor, to generate electric energy it becomes a generator, and in the systems with which this article has to do the generator is driven by the gasoline engine of the car.

The magneto is a generator in that it is driven to create current, and the type depends upon the construction, the low-tension machine developing a low voltage current that is intensified by a transformed coil, and the high-tension machine creating a higher voltage through the secondary windings of the armature. The eventual result is a current of sufficient potential to serve the purpose.

General Form of Generator.

The usual generator of a lighting system is a dynamo that creates direct current that is charged into a battery, with such regulation that at very slow engine speeds the voltage is not sufficient to energize the cut-out circuit breaker. When the engine has reached such a speed that the voltage will close the circuit the current will charge the battery, and the charging will continue until a maximum speed will develop such voltage that either resistance will be introduced into the circuit to prevent charging at a high rate, or the circuit may be broken until the speed of the engine

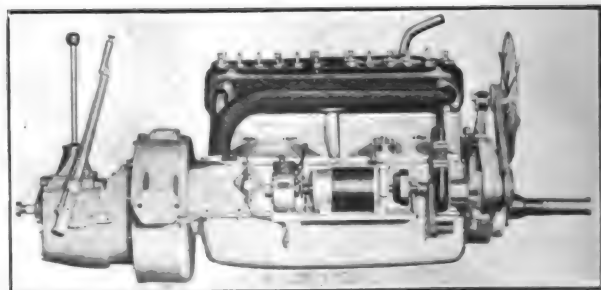
is reduced to or below the maximum for charging.

To better understand that statement relative to the generator a brief explanation of a battery is necessary. The battery is built to have a stated capacity, and theoretically it should be charged and discharged fully and regularly to obtain the best results and the longest life. This statement is true of all batteries, but is especially applied to the lead-acid cells. The current charged into it must be direct (moving in one direction only) and when fully energized, if the battery is connected in a circuit, it will discharge. A lead-acid battery may be charged to 2.5 or even 2.55 volts a cell, but when the voltage is reduced to 1.75 a cell it is considered discharged.

When the battery is fully charged the voltage will be equal to the charging voltage of the generator, and at this point the battery pressure or voltage will prevent further charging, the dynamo being so designed that it will cease to charge, or the battery voltage pressure will operate a circuit breaker or cut-out. If this provision for terminating the charge were not made the battery voltage would increase until it exceeded that of the dynamo and then the battery would begin to discharge to the dynamo. For these reasons it is necessary to have the current regulated so that the battery will not be over-charged, and so it will not discharge through the charging circuit, as when the generator voltage is decreased to less than battery voltage, or when the generator is stopped. One will note that the dynamo is a generator in that it makes current when driven by the car engine.

Forms of Generator Drive.

The generator may be driven by any convenient form of power transmission, by gears, chains, belt or even friction contact, but the first mentioned are most common.



Right Side of Engine with Two-Unit Electric System, Showing Generator-Distributor Unit.

The motor used for starting the engine is practically the same in construction as the generator, though generally somewhat different in

design, and this is intended to be operated by current drawn from the storage battery. The driving or pinon end of the armature shaft may be coupled with a gear carried on the flywheel of the car engine, or it may be connected with the timing gearset by gears or chains. No matter what the coupling, there is usually some form of clutch, frequently of the over-running type, so that when the motor is started and the engine increases its speed, the clutch is disengaged and the motor is cut out, generally by release of the pedal or button by which it is started.

The Motor Generator.

In some systems the generator and the motor are combined in one machine, this being a practical construction, which has the advantage of lighter weight, and while it may be more complicated than either the separate motor or generator, it is in practise simpler than the system that includes both machines operated separately. In this the machine is so designed that in starting the engine it is a motor, having all the characteristics and qualities, but after starting it becomes a generator and will charge the battery in the same manner as has been described. The regulation of the current while charging and while discharging is practically the same.

Some System Characteristics.

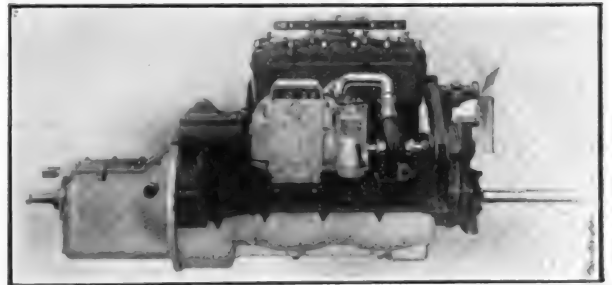
A large number of systems are in use that differ somewhat from each other, but the same general principles of electric design and construction will apply to all. Obviously description of them all would be impossible, and as changes and improvements are frequently made, no good purpose would be served by a detail statement of design that would apply to previous productions and would not include the latest makes. These systems are not always utilized the same. One type, for instance, may be a motor-generator that will start the engine by a pinion meshing with a ring gear attached to the flywheel of the engine, and is also coupled by a shaft with the timing gearset of the engine so that as a generator it is driven from these gears, either coupling being released to meet the requirements of the service it is to do.

Another system is the separate generator and motor, the generator being driven by the timing gearset and the motor driving the engine from the other side through the same gears. A third system is the separate motor and generator, the former starting the engine through the ring gear of the flywheel and the generator being driven by the timing gearset. These are, of course, combinations that serve for engine starting and lighting, or more properly, battery charging. The

magneto can be used for ignition, either with the motor-generator or the separate machines, but with the combination of ignition from the battery a distributor or igniter can be combined with the motor-generator, with the generator, or used independently.

Capacity of the Battery.

There is one characteristic of an electric battery that should be impressed upon the mind of every car owner or driver. The rated capacity is expressed in volts, which corresponds to pressure, and amperes, which corresponds to quantity. Thus a 12-volt, 100 ampere-hour battery is theoretically expected to deliver current at a pressure of 12 volts at amperage of 100 for one hour, or one ampere for 100 hours. In practise, however, this is not realized. The normal charging rate of the battery may be seven hours and the discharge rate is based on eight hours discharge. If discharged in eight hours the highest output will be realized, but if discharged in one



Six-Cylinder Engine with One-Unit System, This Being a Combination Motor-Generator-Distributor.

hour the output would probably be not more than 50 per cent. of the rating.

Rapid Battery Discharge.

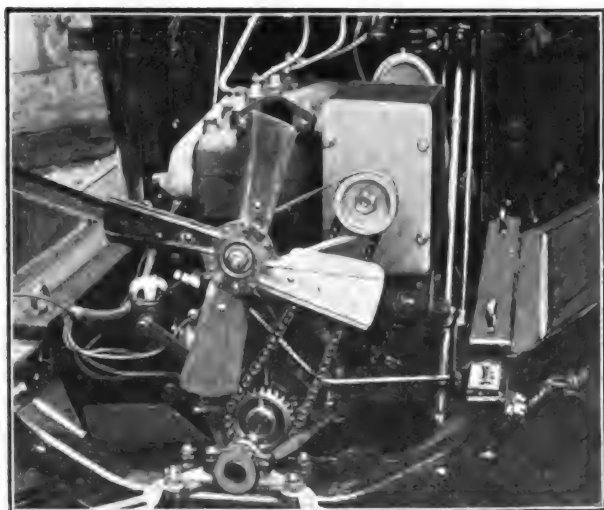
The discharge of a battery may be made very rapidly, as, for illustration, overturning a bucket of water, and very high amperage can be realized for a brief period without damage to the cells, but such high discharge rate could not be continued for any material length of time without serious results. The demands made upon a battery for starting the engine are greatly in excess of the normal discharge, and yet because of the short interval this rate is maintained there is no deterioration resultant.

The reader may assume that the entire energy of a 100 ampere-hour battery when directed toward discharging for a period of a few seconds, which is all the time normally required to turn an engine to firing speed, may be greatly in excess of the power that could be maintained even for minutes, and, of course, the discharge rate is based on hours. The starting motor is not large,

for its power is obtained through its own speed, the reduction gearing coupling it with the timing gears of the flywheel of the engine.

How Generator Is Driven.

The generator is always geared to be driven from the timing gearset, and the driving may be by spur pinions or chains. The motor may be connected with timing gears or the flywheel. The magneto or distributor is driven from the timing gearset. There are types of motor generators made that are in design what is known as regenerative, that is, when the engine is running slowly or idling the machine will serve as a motor, and with power drawn from the battery will partly drive the engine. With installations of this character care should be taken that the battery is not too heavily drawn upon by continued slow driving or by running the engine idle. When the



Motor-Generator to Start the Engine and Charge the Lighting Battery of a Ford Chassis.

speed of the engine is sufficient the motor will become a generator and will charge the battery.

Systems for Ford Cars.

The statements made in the foregoing must not be applied to Ford cars, because of reasons that will now be considered. The ignition system of the Ford power plant may be included in that class known as "built-in," because the current is generated by a dynamo which consists primarily of a series of permanent magnets fixed to the flywheel, which revolve within a field in which the coils are spools of narrow copper ribbon. The dynamo is enclosed within the engine case and is driven in lubricant. It generates an alternating current of low tension that is intensified by a series of coils (one for each cylinder in the regular construction), and this is distrib-

uted to the spark plugs by a timer. Current supplied by this dynamo is often utilized to light the head and tail lamps, as well as for ignition.

While this system is efficient for the purpose for which it was developed—ignition—and it affords reasonably satisfactory service for lighting, the current is variable because of the differing speeds of the engine, and when the car is driven slowly the lights will be much below the efficiency obtaining when moving at a moderate road pace. If the engine is idling the current is weak, and when the car is stopped no current is available unless the engine is operated, and the expense for fuel, lubricant and general wear for lighting the necessary road lamps in this manner is practically prohibitive. A storage battery could be added to the equipment and drawn upon by switching when the lamps were needed and the engine stopped, but this could not be charged from the alternating current dynamo without rectification, and the dynamo has not sufficient capacity to supply current for ignition, lighting and battery charging simultaneously.

This precludes the use of the dynamo for any other purposes than originally intended. The drain upon a battery for starting is considerable, and it must be charged. But even were the battery installed the engine could not be started without a motor of sufficient capacity. As the dynamo must be retained as a part of the engine, this is usually continued for generating ignition current, and a starting and lighting system is installed that consists of a motor-generator and a storage battery, the generator charging the battery and the current for lighting and starting being drawn from this. Such equipment may be classified as the two-unit system.

What has been stated is with reference to equipment usually supplied by the manufacturer of cars, and, aside from the Ford, does not include old machines to which electric systems may be fitted to increase their serviceability.

(To Be Continued.)

Action is to be brought by the attorney-general of New York state to recover from the city of Buffalo the amount of money collected in fines assessed on motorists during the past five years. The Callan motor vehicle law, under which the fines are collected, provides that the money shall be paid into the state treasury and expended in the construction of roads. The city of Buffalo, along with many other New York state cities, contends that the city charter gives it the right to retain the fines. This question will be definitely settled by the suit.

GENERAL NEWS OF THE INDUSTRY.

Briggs-Detroit Company Sold—Willys-Overland Makes Remarkable Shipping Records—Pope Westfield Plant Sold for \$725,000.

THE personal property of the bankrupt Briggs-Detroit Company has been purchased by A. O. Dunk, president of the Puritan Machine Company, Detroit. According to his announcement the business of the company is to be continued by the Detroit Motor Car Company, which has already been formed, with Mr. Dunk as president and Frank M. Eldredge as advertising manager.



A. O. Dunk, President of Detroit Motor Car Company.

An offer of \$48,000 for the real estate, consisting of plant and land, was refused, it having been provided that the trustee, the Detroit Trust Company, could not sell for less than \$75,000 without the referee's approval and for not less than \$63,000 without giving notice to the creditors.

The Briggs-Detroit Company made and shipped 1100 four-cylinder cars in 1912, 2750 in 1913 and 1600 in 1914. It had made and shipped 450 four-cylinder and 280 eight-cylinder cars up to the time it went into the hands of the receiver.

The officials of the new Detroit Motor Car Company are said to be now operating the service, parts and manufacturing departments.

WILLYS-OVERLAND BIG RECORD.

Never before in the history of the automobile business in America has any manufacturer of medium or high priced cars equalled the record made in June by the Willys-Overland Company,

Toledo, O. The month's shipments amounted to 9010 cars, showing an increase of 163 per cent. over those of the corresponding month of 1914.

The previous high water mark in Overland production was in March last, when 7005 cars were shipped. This record is exceeded for June by 30 per cent. Even in Canada, where one would expect a decrease because of the general retrenchment due to the war, more Overlands have been shipped and sold there so far this year than during the whole of 1914.

Export shipments, not including Canada, show the same remarkable increase over last year's figures. At the close of June foreign shipments amounted to fully 70 per cent. of the entire export shipments of 1914. In spite of the increased shipments, orders are showing a steady gain, there being at the close of the period more than 20,000 unfilled orders on hand, more than at any time in Overland history.

President Willys is exerting every effort to cope with the situation, and is steadily increasing manufacturing facilities. Production has jumped from 200 cars a day to the present average of 400, and Mr. Willys is formulating plans that will make possible a 600 daily production.

Nearly 11,400 men are required to keep the plant going at full capacity, and many of the departments are working on a continuous 24-hour schedule, which keeps a night shift of 1500 busy.



Puritan Machine Company's Plant in Detroit, of Which A. O. Dunk Is President.

The Overland plant is declared to be the largest in the world devoted exclusively to the manufacture of automobiles. It comprises 67 buildings, containing more than 79 acres of floor space, 17 acres of which have been added recently.

MADISON PRODUCTION BEGUN.

Production is already under way at the Madison Motors Company, Anderson, Ind., although the new Hoosier factory did not get going until just before the Indianapolis races. The speed with which operations were begun is due in large measure to the fact that nearly everything was in readiness when Cecil E. Gibson assumed the

presidency.

Few men in the manufacturing end of the automobile industry have as wide dealer knowledge as is possessed by President Gibson. At various times he has sold almost all the well known cars on the American market. He began as a bicycle repair man. Reference to the Indianapolis races, in the



Cecil Gibson, President of Madison Motors Company.

foregoing paragraph, recalls that Mr. Gibson and Carl Fisher, president of the Indianapolis Speedway, were at one time associated in business, under the firm name of Fisher-Gibson Company in Indianapolis, and handled Overland cars. Later Mr. Gibson became the heaviest stockholder in the Empire Auto Company of the same city and its general manager and also the designer.

MARION AND IMPERIAL IN NEW HANDS.

Exclusive sales rights, good will, trade name, etc., in the Marion and Imperial automobiles have been acquired by the Mutual Motors Company, Jackson, Mich., and the cars will hereafter be marketed through individual and separate de-

partments of its own company instead of through separate selling corporations as heretofore.

The Mutual company does not take over any of the physical assets or assume any of the obligations of either of the two companies, but has simply acquired the sole selling rights of both names, and the change does not in any way effect the field and dealer organization of either line.

Manufacture of both lines will be continued by the Mutual company. The Imperial Four, formerly listed at \$1085, is reduced to \$995, and the Six is reduced from \$1285 to \$1185. The Marion light six will be priced at \$1185 instead of \$1250 as formerly.

POPE PLANT GOES FOR \$725,000.

H. P. Coursen of New York City, representing W. C. Walker of the Hartford Motor Car Company, and Scott McLanahan of New York, bought the Westfield plant of the Pope Manufacturing Company at public auction for \$725,000. Included in the sale is all the real estate, 15 acres, the buildings, machinery and equipment, and the \$229,186.65 in cash on hand with the receivers July 19. The liabilities incurred by the receivers during operation of the plant is assumed by the purchasers.

Rumor has it that a new company will be formed with a capitalization of \$1,600,000, which will be divided equally in common and preferred stock. The president is expected to be W. C. Walker, while his brother, C. E. Walker, of the Walker Barkman Manufacturing Company, will probably be associated with him. Many Hartford people are said to be interested financially.

ANTICIPATES PAYMENT.

The Emil Grossman Manufacturing Company, Brooklyn, N. Y., maker of Red Head spark plugs and other specialties, has anticipated the due date of the first of the extension notes which the company issued when some time ago it effected a time compromise with its creditors for the full amount of their claims. Checks in full payment were mailed June 25, a week before due. The company reports an exceptional business, the gross volume exceeding any previous year by 55 per cent.

WILLYS STRENGTHENS KNIGHT LINE.

The Willys-Overland Company continues to strengthen its Knight division by the acquisition

of industrially strong men. The latest additions include John F. Toole and A. W. Barber.

Mr. Toole gained his knowledge largely with the F. B. Stearns company. Of late he has been branch manager for the Hupmobile at Atlanta, which position he resigned to take up duties for the Willys-Knight, with headquarters in the Georgia capital.

Mr. Barber, for many years prominently identified with the Stevens-Duryea company and recently its San Francisco branch manager, will represent the Willys-Knight in the East, with headquarters at New York City.

GIGANTIC MOTOR CAR ORDER.

What is said to be the largest single order for automobiles ever placed for delivery in the United States, was the order for \$1,200,000 worth of Mitchell Sixes, placed recently by the Carl H. Page Motors Company, New York City, with the Mitchell-Lewis Motor Company, Racine, Wis.

Since announcing the "Six of '16," the new Mitchell model, and the "Perfect Eight," the Mitchell-Lewis Company has booked approximately \$5,000,000 worth of business for delivery as the product comes from the factory, according to the company's statement. The company is working day and night, and is taking on new men as rapidly as experienced men can be secured.

CADILLAC LOSES AXLE SUIT.

The United States circuit court of appeals has upheld the findings of the lower court that the two-speed rear axle used in 1914 Cadillac cars is an infringement of patents held by W. S. Austin of Grand Rapids, Mich. The axle was first shown at the Chicago automobile show in 1913 by Austin, and at that time was offered by him to the Cadillac Company. An axle was shipped for inspection and test and the feature was incorporated in the 1914 design. They did not, however, recognize the validity of the Austin patents and in court produced 17 patents on other devices of similar nature to offset the Austin claims. The court held, however, that none of these axles was successful, while the Austin device for the first time overcame difficulties that others had failed to remove.

HUNT BECOMES CHIEF ENGINEER.

O. E. Hunt, for several years assistant to J. G. Vincent, vice president of engineering for the Packard Motor Car Company, has been appointed

chief engineer. Mr. Vincent has inaugurated a unique factory engineering organization and his department forms an experimental factory in itself. The Packard engineering staff, which is declared to be the largest in the industry, numbers over 200 members, and requires between \$400,000 and \$500,000 annually for development work.

BUYS INTERNAL GEAR DRIVE.

When his supply of Mercedes trucks for sale in England was shut off by the war, H. G. Burford, a leading English motor car distributor, who has been identified with the industry for 15 years as maker and seller, came to the United States to get a supply.

"Taking Europe as a whole there are four internal gear drive trucks turned out there to every one with another type of shaft drive. This is not so true of England as of the continent, for the internal gear drive when first introduced there was noisy and was passed by for other forms of construction," said Mr. Burford.

"I found that some American companies were making trucks of this type very similar to those which are so popular in continental Europe. This gave me an opportunity to continue my business as before substituting only America for Germany as the source of supply. I have been able to contract for a large output of these trucks, and as I have already placed 100 in England, which are giving perfect satisfaction, I am confident of a large business in the near future."



J. E. Garlent, King's Factory Manager.

GARLENT IS KING'S FACTORY HEAD.

Increased factory production, together with the expansion of the King Motor Car Company's

Detroit plant, is given as the underlying reason for the acquisition of another big industrial man in the King official family.

J. E. Garlent, who has been general superintendent of the Hupmobile, is now factory manager for the King company, co-operating directly with J. F. Siegfried, assistant general manager and factory production manager. Mr. Garlent was in his early days connected with manufacture of the Brush, the Elmore and the Oakland cars.

FACTORY EFFICIENCY CUTS TIRE COST.

The Federal Rubber Company, Milwaukee, has installed a new low pressure turbine system by which waste steam from reciprocating engines, vulcanizers and other steam using apparatus is made to produce 1500 horsepower, doubling the capacity of the power plant without adding to the fuel bill.

All stoking and handling of coal is done in the Federal plant without human labor. The coal is dropped from freight cars into a hopper in the basement of the power house and is mechanically conveyed to overhead bins, from which it is fed by gravity to the furnaces. Ashes are mechanically removed to overhead bins and fall through a chute to freight cars or trucks for removal.

300,000 FORD CARS SOLD.

During the afternoon of July 16 the 300,000th Ford car to be made and sold during the fiscal year ending Aug. 1, was completed, and thus was insured the rebate of \$50 to each purchaser during the year that the company had promised if that number of cars was attained. Preparations for the tremendous profit sharing distribution are now being made.

KING MAKES CHASSIS CHANGES.

The King Motor Car Company has added a roadster to its line. This car is mounted on the regular King Eight, 113-inch wheelbase chassis, and has a three-passenger body.

The body, hood and radiator are painted crimson lake, while the fenders are of black enamel and the chassis black. Natural wood wheels are regular equipment. The roadster sells for the same price as the touring car, \$1350 F. O. B. Detroit.

It is announced also that a few changes have been made in the King Eight chassis, which will

continue to be sold at the same price during the coming year. The bore of the motor has been increased from $2\frac{3}{4}$ inches to $2\frac{7}{8}$ inches. Larger valve ports are used, a larger intake manifold and a larger and improved type of Zenith carburetor.

The King company opposes announcements in the middle of the summer as opposed to the interest of dealer and buyer.

STEARNS REDUCES PRICE.

The erection of a new five-story building, equipped with the best facilities for producing the Stearns-Knight light four model, is declared to enable the F. B. Stearns Company, Cleveland, to lower the price on this car from last year's list of \$1750 to the present price of \$1395. The price reduction is attended by improved body design and added mechanical features. This model won great popularity last year, although produced in limited quantities, and the company has decided to continue it for 1916.

OUTPUT SOLD FAR AHEAD.

The Continental Motor Manufacturing Company, Muskegon, Mich., is building two new additions to its plant, and announces that its product is contracted for far in advance of production. The payroll of the corporation in Muskegon alone amounts to more than \$100,000 a month, or a total of about \$1,200,000 a year. Muskegon employees number 1699 men, 1635 of which are employed in the shops.

PREMIER MAY MOVE.

In a letter written to J. F. Sperry of the Twin City Motor Speedway Company, Frank E. Smith, trustee of the Premier Motor Manufacturing Company, Indianapolis, stated that "the Premier company is figuring on coming to St. Paul and an entire reorganization of the company shall be effected."

A. Gilson has been appointed as assistant to E. W. Hawley, service sales manager of the Puritan Machine Company, Detroit.

The Kline Motor Car Company, Richmond, Va., which for several months past has been practically shut down, is now being equipped as rapidly as possible with machinery for the manufacture of shrapnel and high explosive shells.

HERFF-BROOKS REDUCES PRICES FOR 1916.

WITH the announcement that the Herff-Brooks cars will be built for the coming year in two types, four and six-cylinder machines,

Perhaps the most conspicuous change is in the power plant. The three main divisions of the system, the motor, clutch and transmission gear-set have been included in a single unit. This is suspended from the frame at three points by arms to the main frame from either side at the rear of the crank case, and by a trunnion support from the front cross member of the frame.

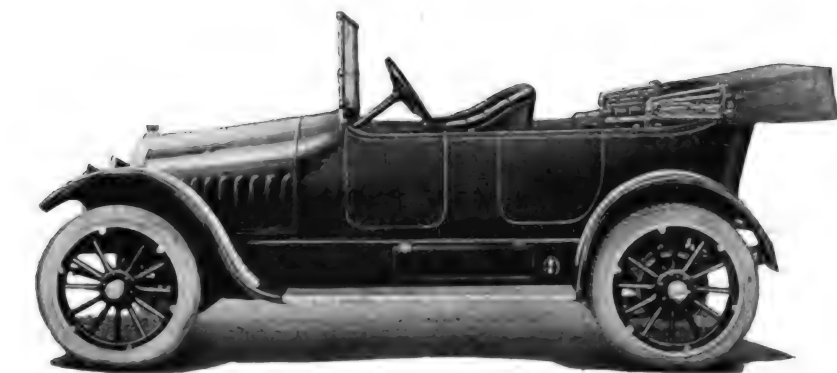
In both the four and the six-cylinder engines the dimensions of the cylinders are the same, namely, four inches bore by $4\frac{1}{2}$ inches stroke. In the preceding four-cylinder motor, the engine had a bore of $4\frac{1}{2}$ inches and

stroke of five inches, but the six-cylinder engine was the same as stated. The cylinders of both motors are individually cast.

Exceptionally ample crankshaft bearings are fitted in both motors, there being five bearings in the four-cylinder engine and seven bearings in the six-cylinder. This design affords the most rigid support. All bearings are fitted with shims.

The engines are cooled by thermo-syphon systems. The radiators are honeycomb types with rounded edges, which enhance the appearance of the front ends of the car. The water capacity is large, insuring the most efficient cooling under all conditions of operation.

The oiling systems for both motors are what is described as the pump over splash. A pump raises the oil from the reservoir at the bottom of the crankcase and forces it through a sight

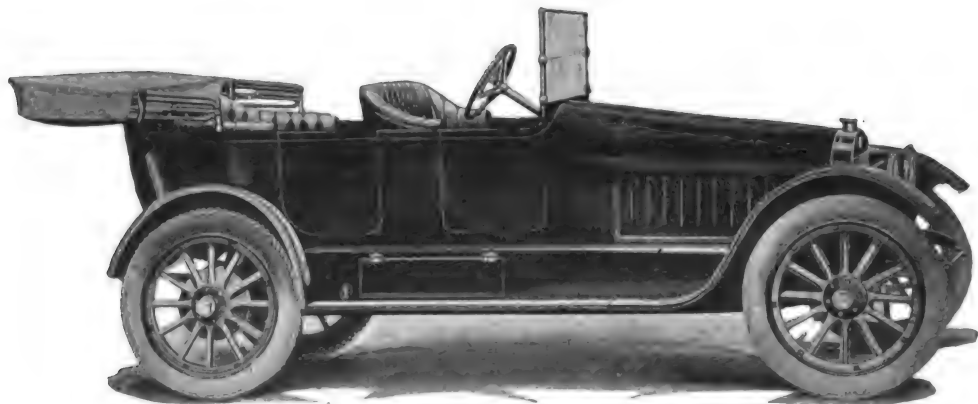


Herff-Brooks Four-Cylinder Touring Model, Selling at \$885.

the prices for these are stated to be \$885 for the former and \$1095 for the latter, which are reductions of \$215 and \$290 respectively, as compared with 1915 values. The designs have been considerably changed to obtain increased efficiency and greater endurance, and statement is made that because of larger production and manufacturing economies quality has been improved, though the prices have been materially reduced.

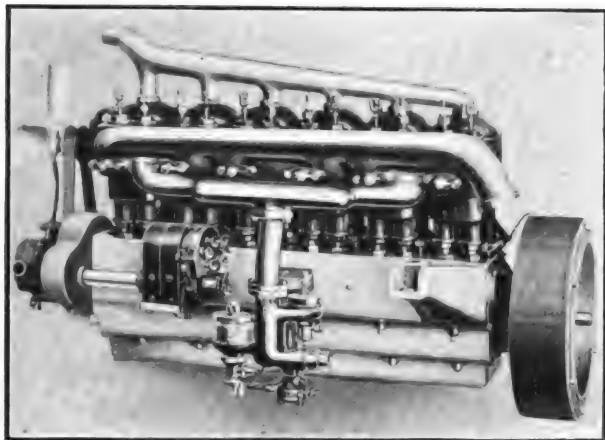
One factor that has influenced the price reduction has been the lower cost of material through purchasing components in much larger volumes, and increase of production by the part manufacturers has also contributed to reduced prices. The practical labor economies because of the change of design are of considerable importance as well.

While no radical changes have been made in the construction of the chassis, the designs have been brought closer to what may be regarded as standard practice and refined and improved wherever this could be done. The results are extremely well balanced machines that are stated to be especially satisfactory for all round purposes.



Herff-Brooks Six-Cylinder Touring Model, Priced at \$1095.

feed on the dash, thence through tube to troughs at the bottom of the crank case, which the connecting rods splash, the excess oil draining to the



Six-Cylinder Motor Installed in Herff-Brooks Models and Motor, Clutch and Transmission in One Unit.

reservoir. The lower ends of the connecting rods are fitted with scoops, which distribute the oil to all bearings and moving parts of the motor. The oil in the troughs is maintained at a constant level.

Schebler carburetors are used, these being attached to unusually short intake manifolds, which insures free passage of the gas into the cylinders. The high-tension Splitdorf magnetos are driven through noiseless leather couplings by shafts supported on long and heavy bearings, for which are fitted with special and unusually efficient means for oiling.

The inverted cone clutches used last year have been replaced by the more common type of standard cone, leather faced types with spring inserts to effect easy engagement. The transmission gearsets are light but strong. These are made of high-grade, heat treated steel, with shafts and gears of ample dimensions. The shafts and gears are carefully hardened and ground. The main shafts are mounted on ball bearings and the counter shafts on Hyatt roller bearings.

The steering gears are full worm type, with 18-inch hand wheel, these being mounted for left side driving. The gear shift mechanism is a cane handle type and the levers are mounted directly upon the transmission gearset housings in the centres of the front compartments. The foot levers are also mounted on the gearset cases. The engagement of the gears is smooth and noiseless.

Behind the transmission gearsets are universal joints, which are connected by straight shafts to the rear axles. These shafts are protected by torque tubes of ample dimensions, which are

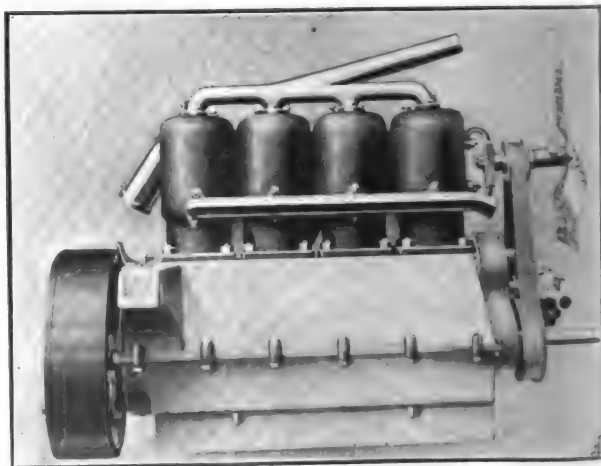
fastened to the rear axle housings. The yokes which were formerly fitted over these tubes are not used this year.

The rear axles are semi-floating types, with heavy New Departure ball bearings. The gear ratios in both cars are four to one, with an option of $3\frac{1}{2}$ to one. The front axles are drop forged I beam sections. The front springs are semi-elliptic and the rear are three-quarter elliptic. These are mounted differently than those of the models produced by the Herff-Brooks company last year. The rear halves of the springs are swung under the axles instead of over it. This construction allows the springs to open wider and affords greater spring action.

The wheels are artillery type, with quick detachable, demountable rims. One extra rim is supplied. The tires are Goodyear 33 by four inches all around, with non-skid treads at the rear. The wheelbase of the four-cylinder car is 110 inches, and that of the six-cylinder car is 120 inches. The standard tread is 56 inches, but a 60-inch tread is supplied to southern buyers if specified.

Only two types of bodies are supplied this year—touring cars and roadsters. The designs are described as conservative and yet modern. The bodies have many attractive features, which will be appreciated by the sophisticated buyer. For both the six and four-cylinder cars the bodies are practically identical in outline. The hoods are straight and tapering, and these run smoothly into long cowls. The chassis have close fitting crowned guards and clean running boards.

The tops are a one-man design, attaching di-



Compact Four-Cylinder Herff-Brooks Power Plant.

rectly to the stanchions of the two-part windshields when extended and fitting neatly under a dust cover at the rear of body when not in use.

The seats are high backed and deeply upholstered. The finish of the cars has been made a special point by the manufacturers, who have sought to obtain the fine appearance with a low cost of manufacture. The crowned fenders and sloping hood are heavily japanned and the bodies are finished with many coats of paint rubbed to a fine surface and varnished. Much care has been given to finishing and the company believes that the standard it has established is remarkably high considering the prices of the cars. The standard colors are Brewster green for the bodies, with black hoods, fenders and running gear, and pearl gray striping and nickelled fittings.

The bodies have been designed to supply maximum room for the passengers. From the front seats to the dashes there is a space of $27\frac{1}{2}$ inches. The seats are 18 inches deep and 43 inches wide. The rear seat of the touring bodies have depth of 21 inches and a width of 52 inches. The overall length of the bodies is eight feet five inches.

The cowls are neatly designed and add much to the appearance of the cars. Upon these are mounted the starting switches, horn buttons, carburetor air valve adjustments, speedometers, ammeters, light switches, sight feeds for the oiling systems and the cowl lights.

With adjustable foot pedals the drivers can meet their own requirements for comfort. The accelerator, muffler cut-out and starting motor pedals are so arranged that they may be reached with the greatest convenience with the feet.

The electric starting and lighting equipment of the cars is standard. The dynamo is bolted to the right rear arm of the crank case and is driven through a silent chain that is enclosed in the crank case and which operates on a sprocket on the crank shaft near the rear end of the crank case.

This construction insures the operation being exceptionally silent, while the dynamo and chain are driven with the least loss of power through friction. The remainder of the electrical equipment consists of head, tail and dashlights, dimmers for the headlights taking the place of dashlights.

The standard equipment includes spare tire carriers at the rear of the body, robe and foot rails, tire repair kits, tools, special wrenches and the like, an electric horn carried under the bon-

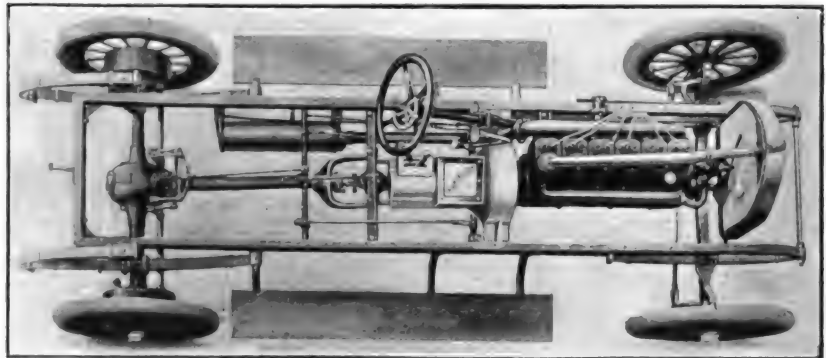
net, an indicating cut-out switch, clear vision, double-ventilating windshield, one-man mohair top with quick attachable side curtains, Stewart-Warner speedometer and one extra quick detachable, demountable rim.

DRIVES FAR IN SCRIPPS-BOOTH.

That the Scripps-Booth car is exceptionally able on the road, as well as being luxurious and handsome, was shown recently when R. H. Spear, the general manager of the Scripps-Booth company, drove from Detroit to Chicago, 353 miles, on Saturday and back again on Monday. The present roads provide the hardest kind of a day's run for even the largest cars.

HARD TIRE TEST IN MEXICO.

A trip of 6000 miles across country and over



Constructional Details of the Herrf-Brooks Chassis.

broken roads of Mexico was recently made by N. J. Kingsley, Houston, Tex., driving the car of General Hemandey of Villa's army. The car was equipped with 41 by $4\frac{1}{2}$ Federal tires. No tire repairs were available and it was necessary to stuff the casings with grass and straw and run long distances on that. Yet at the end of the trip the casings were unbroken and in good condition to receive new tubes.

ECONOMY ON LONG TEST RUN.

While the new model Grant Six was being tested recently before being put on the market, it was given a hard 1000-mile run over the mountains and all sorts of roads. Particular attention was given carburetion as accomplished by the Rayfield model G carburetor, which was adopted, and a large order placed for 1916 equipment. The car averaged $19\frac{1}{2}$ miles per gallon for the 1000 miles.

GREAT OIL PRODUCTION LOWERS PRICES.

FIVE years ago the automobile business seemed to be confronted by a shortage of gasoline, and its future was thought by many observers to be menaced. Gasoline was selling at retail at from 22 to 25 cents in this country, and with the growth in the number of motor cars there seemed to be nothing that could prevent the situation becoming more severe.

But many factors have been at work to alter conditions. In spite of the enormous increase in the use of motor cars, gasoline is cheaper than it has been for a long time, ranging from nine to 18 cents at retail in various parts of the United States.

Among the factors responsible for this change are the discovery in the West and Southwest of great new oil fields. These fields now yield so much crude oil that its price has fallen to a point where further development will probably be checked until consumption again overtakes the present production.

New processes of refining have made it possible to use a far larger portion of the crude for fuel purposes than was formerly possible.

New Gasoline Processes Discovered.

Discoveries of this nature are still being made. The gasoline process recently brought forward by Dr. Rittman, the government chemist, who has turned his rights over to the public, so that the process may be used for the benefit of the people by any one who desires, is one that is likely to have a still greater influence in cheapening motor fuels.

Equally important discoveries are those which have made it possible to produce motor fuels from other bases than petroleum. Benzol, which is produced from coke and coal, is such a fuel. It has not been much used in this country, because its production cost has been greater than the price of gasoline here. But in Europe, where gasoline is much higher in price owing to freight and duty charges, it has developed a very large sale. This, of course, tends to keep down the cost of gasoline, since it reduces the volume that is exported and hence increases the American supply.

Dr. Rittman has discovered also a benzol process which will permit cheaper production and if, at any time, gasoline should become high, benzol is likely to come prominently into the market. It can be used in an ordinary motor car with the usual carburetor without any changes whatever.

At the same time alcohol fuels have received a great deal of attention. One called Natalite was tested in London recently and found, on a basis of equal price per gallon, to be practically as efficient as gasoline. It is distilled from waste molasses in the sugar factories of Natal in Africa.

A New Fuel for the Tropics.

Its cost can be greatly reduced by large scale production and the crops from which it is made can be grown in any desired quantity. If excise restrictions are removed, as they doubtless will be, this material is quite likely to become the standard motor fuel in tropical climates, where it will be produced, and although it never invades the American market, it will tend to keep gasoline prices down by decreasing the export drain on American production. It, too, can be used in any motor car, the only adjustment necessary being the admission of a larger air supply to the carburetor.

Another factor of great importance has been the improvement in engine carburetors. Early in the industry the carburetors supplied were able to use satisfactorily only a very high-grade of gasoline. Now much lower grades yield entirely successful results and the carburetor capable of using both gasoline and kerosene is a reality. High gasoline prices would doubtless bring about the use of kerosene as a relief.

The United States geological survey has just issued a report showing that the crude oil produced in the United States in 1914 amounted to 265,762,535 barrels, which is 17,316,173 barrels more than was produced in 1913. In addition to this, 24,550,000 barrels was pumped from the wells, but was stored in tanks on the oil fields instead of being used.

The table on the opposite page shows the amount and value of the production in the various fields and the prices at which it was rated. Producers' storage in the Oklahoma fields, which are now second in the amount of oil produced, became so great during the year that it exercised a marked influence on the market price of oil.

Larger Production, Less Value.

The increase in the production of crude oil nearly seven per cent. in 1914 as compared with 1913, and the great reduction of foreign shipments, which were interrupted by the war, brought the price of crude oil down to a point where the increased production was actually of less value than the smaller production of 1913.

OIL PRODUCTION DURING 1914.

State or region.	1913			1914			Increase (+) or decrease (-).		Per cent of increase (+) or decrease (-).	
	Quantity (barrels).	Value	Average price per barrel.	Quantity (barrels).	Value.	Average price per barrel.	Quantity (barrels).	Value.	Quantity (barrels).	Value.
Alaska.	(a)	(a)		(a)	(a)					
California.	97,788,525	\$45,709,400	\$0.467	99,775,327	\$48,066,096	\$0.482	+1,986,802	+2,356,696	+2.05	+5.16
Colorado.	188,799	174,779	.926	222,773	200,894	.902	+33,974	+25,115	+17.99	+14.94
Illinois.	23,893,899	30,971,910	1.296	21,919,749	25,426,179	1.180	-1,974,150	-5,545,731	-8.26	-17.91
Indiana.	966,066	1,279,226	1.337	1,335,456	1,548,042	1.159	+370,361	+268,816	+39.06	+21.01
Kansas.	2,375,029	2,248,283	.947	3,103,585	2,433,074	.784	+728,556	+184,791	+30.68	+8.22
Kentucky.	524,568	675,748	1.288	502,441	496,566	.992	-22,127	-177,192	-4.22	-26.22
Louisiana:										
Northern—										
Caddo.	9,781,560	9,812,342	1.003	7,572,254	7,177,535	.948	-2,209,306	-2,634,807	-22.59	-26.85
De Soto.				3,834,593	3,649,922	.952	+3,834,593	+3,649,922		
Red River.				401,622	379,229	.944	+401,622	+379,229		
Total.	9,781,560	9,812,342	1.003	11,808,469	11,206,686	.949	+2,026,909	+1,394,344	+20.73	+14.21
Coastal—										
Jennings.	790,648	769,917	.974	412,036	374,611	.909	-378,612	-396,306	-47.89	-51.34
Welsh.	31,144	26,745	.859	18,629	17,614	.946	-12,615	-9,131	-40.18	-34.14
Anse la Butte.	6,612	5,290	.800	18,623	17,038	.916	+12,011	+11,748	+181.66	+222.04
Vinton.	1,888,864	1,641,637	.869	1,465,302	983,568	.671	-423,562	-658,049	-22.42	-40.08
Edgely.				586,376	287,362	.490	+586,376	+287,362		
Total.	2,717,268	2,443,589	.899	2,500,966	1,680,211	.672	-216,302	-763,378	-7.96	-31.34
Total Louisiana.	12,498,828	12,255,931	.981	14,309,435	12,886,897	.901	+1,810,607	+620,966	+14.49	+5.15
Michigan.	(a)	(a)		(a)	(a)					
Missouri.	(a)	(a)		(a)	(a)					
New Mexico.	(a)	(a)		(a)	(a)					
New York.	948,191	2,284,307	2.409	938,974	1,780,898	1.875	-9,217	-523,439	-.97	-22.91
Ohio:										
Southeastern.	4,964,425	12,229,610	2.463	4,809,265	8,937,415	1.858	-155,160	-3,292,196	-3.13	-26.92
Lima.	3,817,043	5,308,842	1.391	3,727,087	4,435,314	1.190	-89,956	-873,528	-2.36	-16.45
Total.	8,781,468	17,538,452	1.997	8,536,352	13,372,729	1.567	-245,116	-4,165,723	-2.79	-23.75
Oklahoma.	63,579,384	59,581,948	.937	73,631,724	57,253,187	.778	+10,052,340	-2,328,761	+15.81	-3.91
Pennsylvania.	7,917,302	19,690,502	2.487	8,170,335	15,573,822	1.906	+253,033	-4,116,680	+3.20	-20.91
Texas:										
Northern—										
Corsicana.	158,830	156,844	.987	133,811	123,556	.923	-25,019	-33,288	-15.75	-21.22
Petrolia.	344,868	342,783	.994	350,585	466,628	.946	+206,717	+122,845	+59.65	+35.83
Powell.	262,476	216,402	.766	282,270	169,490	.600	-197	-46,912	-0.07	-21.68
Electra.	8,131,624	8,142,797	1.001	8,227,968	6,789,359	.826	+96,344	-1,353,438	+1.19	-16.62
Marion County.	262,362	261,965	.998	180,584	175,922	.974	-81,806	-86,043	-31.18	-32.86
Moran.				68,191	47,081	.690	+68,191	+47,081		
Other.	4,062	4,394	1.081	8,204	7,919	.965	+4,142	+3,525	+101.97	+80.22
Total.	9,184,252	9,125,185	.994	9,451,622	7,778,955	.823	+267,370	-1,346,230	+2.91	-14.75
Coastal—										
Baton.	741,350	670,323	.904	775,804	632,926	.804	+34,454	-37,397	+4.65	-5.58
Dayton.	13,329	10,633	.797	18,791	8,813	.469	+5,462	-1,820	+40.98	-17.12
Goose Creek.	249,641	206,311	.826	134,748	79,012	.586	-114,893	-127,299	-46.02	-61.70
Humble.	1,504,980	1,453,158	.965	2,799,458	1,636,468	.548	+1,294,578	+82,310	+86.03	+5.66
Matagorda County.	294,553	266,338	.904	164,192	98,203	.598	-130,361	-168,135	-44.26	-63.13
Orange County.	17,706	19,123	1.080	43,208	44,222	1.023	+26,544	+25,100	+144.03	+131.26
Saratoga.	937,720	855,935	.913	889,743	647,075	.727	-47,977	-208,860	-5.12	-24.40
Sourlake.	1,348,053	1,350,379	1.000	5,209,208	3,534,720	.679	+3,861,155	+2,194,341	+286.42	+161.76
Spindletop.	716,374	716,993	1.000	580,130	582,388	1.004	-136,244	-134,605	-19.02	-18.77
Other.	1,620	1,215	.750	1,280	1,065	.832	-340	-150	-20.98	-12.35
Total.	5,825,226	5,550,408	.953	10,616,562	7,163,893	.675	+4,791,336	+1,613,485	+82.25	+29.07
Total Texas.	15,009,478	14,675,593	.978	20,068,184	14,942,848	.745	+5,058,706	+267,255	+33.70	+1.82
West Virginia.	11,567,299	28,828,814	2.492	9,680,033	18,468,540	1.908	-1,887,266	-10,360,274	-16.32	-35.93
Wyoming.	2,406,522	1,187,232	.493	3,560,375	1,679,192	.472	+1,153,853	+491,960	+47.95	+41.44
Other.	10,843	19,263	1.777	7,792	14,291	1.834	+3,051	+4,972	-28.14	-25.81
Total.	248,446,230	237,121,388	.954	265,762,535	214,125,215	.806	+17,316,305	-23,006,173	+6.97	-9.70
SUMMARY.										
Appalachian.	25,921,785	63,708,981	2.458	24,101,048	45,239,201	1.877	-1,820,737	-18,469,780	-7.02	-28.99
Lima-Indiana.	4,773,138	6,588,068	1.380	5,062,543	5,983,356	1.182	+289,405	+604,712	+6.06	+9.18
Illinois.	23,893,899	30,971,910	1.296	21,919,749	25,426,179	1.160	-1,974,150	-5,545,731	-8.26	-17.91
Mid-Continent.	84,920,225	80,767,758	.951	97,995,400	78,671,902	.803	+13,075,175	-2,095,856	+15.40	-2.59
Gulf.	8,542,494	7,993,997	.936	13,117,528	8,844,104	.674	+4,575,034	+650,107	+53.56	+10.63
California.	97,788,525	45,709,400	.467	99,775,327	48,066,096	.482	+1,986,802	+2,356,696	+2.03	+5.16
Colorado and Wyoming.	2,595,321	1,362,011	.525	3,783,148	1,880,086	.497	+1,187,827	+518,075	+46.77	+38.04
Other.	10,843	19,263	1.777	7,792	14,291	1.834	+3,051	+4,972	-28.14	-25.81
Total.	248,446,230	237,121,388	.954	265,762,535	214,125,215	.806	+17,316,305	-23,006,173	+6.97	-9.70

* Included in "other." * Includes Alaska, Michigan, Missouri, and New Mexico.

* Includes Alaska, Michigan, and Missouri.

The average price per barrel received for oil in 1914 was \$0.806, as compared with \$0.954 in 1913, and the total market value of the oil showed a loss of \$23,006,173.

This indicates that the present exceptionally low price of gasoline is in part due to over production and that a slightly higher level may be expected when the business returns to normal conditions.

Oklahoma, the second oil producing state, gained during the year materially on California, but the coast state still retained its lead by 10,000,000 barrels. Wyoming gained 48 per cent. in production, but the volume was not sufficient to change its relative rank among the oil producing states, which is ninth.

The factors seem to be fundamental and are likely to continue indefinitely, so that an ample and cheap supply should be forever assured.

The accompanying table shows the condition of the crude oil market in detail.

INDUSTRIAL HAPPENINGS AND COMMENT.

THE Chalmers Motor Company, Detroit, announces the distribution of prizes in its spring sales contest. Leo Lux, dealer at Wadsworth, Ill., a town of 150 people, won grand sweepstake prize, a five-passenger Chalmers light six touring car. The first prize for leading salesman in the United States was a trip to the Panama-Pacific Exposition, which was won by J. H. Wetmore, Correctionville, Ia. Earl N. Manbeck of the Iowa Automobile and Supply Company, Des Moines, won second prize, a \$200 chest of silver. A. B. Holabird, Decatur, Ill., won third prize, a \$100 Victrola.

Frank M. Eldredge, advertising manager of the Puritan Machine Company, Detroit, has been elected to membership of the Wolverine Automobile Club of Detroit, and has been appointed to the publicity committee of the club.

The Colorado Tire and Leather Company, Denver, manufacturer of Durable Treads for automobile tires, is building a two-story addition to the plant that will double the present capacity, making a total of 95,608 square feet of floor space. Charles C. Gates, president of the company, was in New York City buying equipment and building material for the addition.



Hyatt Roller Bearing Company's Proposed New Office Building.

The Hupp Motor Car Company, Detroit, has opened a club house for its employees of the executive building on property adjacent to the plant. Temporarily a restaurant is conducted in the building for the employees, but it will be abandoned when the restaurant in the factory proper is complete. The main floor of the club house is given over to the men, while the second floor is devoted exclusively to the girls and women. The lawn surrounding has already been utilized in part for a croquet and quoits court. Management will soon be vested in the employees. The company will supply financial support.

Hugh Chalmers has inaugurated a \$500 prize suggestion contest among the Chalmers factory employees. Mr. Chalmers said recently: "We need the suggestions of our employees to help us run the business properly. We are offering \$500 in cash prizes to those who give us ideas and suggestions that can be used to advantage." First prize will be \$100, and the remainder of the sum is divided as follows: Two prizes of \$50 each; five of \$20, 20 of \$5, 20 of \$2.50 and 50 of \$1. Awards will be announced on Dec. 4. Suggestions are accepted on machinery, substitution of machinery for manual labor, reduction in costs, precautionary health and fire measures, reduction of transportation costs, express and mail, new advertising ideas, how to increase sales. Officials are barred from participation.

Alfred O. Dunk, president of the Puritan Machine

Company, Detroit, in connection with his bid for the personal property of the Briggs-Detroit company, of which he is the highest bidder, has assured the creditors' committee that he would continue the manufacture of the cars, possibly altering the name to "The Detroitler."

The Burd High Compression Ring Company, Rockford, Ill., has begun installation of machinery in an additional new factory building, containing 30,000 square feet of floor space.

The Locomobile Company of America, Bridgeport, Conn., which is building a large addition to its plant, recently took an order for 500 trucks and several hundred officers' passenger cars, for Russia and Great Britain. The company has also a large order for France. At the plant there are three British, three French and the same number of Russian officers inspecting every car that is turned out for their countries. The company is working on an order for 40 trucks which will be fitted up soon as kitchens for Russia.

The Hyatt Roller Bearing Company, Detroit, is erecting a new office building to be three stories high, of rough, red brick, with stone trimmings and fireproof throughout. A large reception room will take up the centre of the first floor, while around it will be the service room, experimental engineers' offices, machine room, garage and telephone exchange. General Sales Manager B. G. Koetcher, Advertising Manager W. E. Biggers and Chief Engineer R. S. Lane will have offices on the second floor.

The Studebaker Corporation's banquet to branch house managers and dealers of the larger cities, held at the administration offices at South Bend, Ind., was an elaborate affair, and marked the close of a three days' business conference in which plans for the coming year were outlined and a preliminary inspection of the new Studebaker models was made. The Lincoln highway was the high note of the decorative scheme, a typical section being reproduced on the table, even to plains, houses, railroads, rivers and lakes, miniature automobiles and trucks, and Studebaker service station signs that align the real highway.

The Goodyear Tire and Rubber Company's wireless station at Detroit supplied the Society of Automobile Engineers during its summer cruise on the steamer Noronic with the news of the world, which was incorporated in the daily paper published aboard.

The Chalmers Northwest Company, Minneapolis, Minn., has been organized and incorporated, its capital stock being \$50,000, of which \$35,000 has been paid in. The new company has been appointed distributor for the Chalmers for practically the entire state of Minnesota and 16 counties in Wisconsin. E. C. Thompson is president; G. N. Michaud, vice president; R. V. Hess, secretary-treasurer; Joseph Warren, formerly with the Chalmers Motor Company, Detroit, sales manager for Minneapolis, and G. N. Michaud, sales manager for the branch to be operated in St. Paul.

The Auburn Automobile Company, Auburn, Ind., has announced a four and six for 1916. The four will sell for \$985 and the six for \$1550. The four has a T head motor cast in block, 3 3/4 by five, unit power plant and with three-point suspension. Other features are cantilever springs, left drive and centre control, electric lights and electric starter and one-man top. The wheelbase is 114 inches. The six is a seven-passenger touring car and has a 3 3/4 by five motor. The wheelbase is 126 inches.

The Duplex Power Car Company, Charlotte, Mich., will increase its capitalization from \$100,000 to \$200,000. The company is far behind in its orders and larger capital is needed to increase the capacity of the plant.

JITNEYS IN RHODE ISLAND'S CAR STRIKE.

DURING the two days' strike of the street car men employed by the Rhode Island Company in Rhode Island cities, the jitney 'buses saved the situation so far as the public is concerned. Thousands of people were taken to work and home again during both days of the strike, and the size of the crowds on the main streets of the cities indicated that notwithstanding the lack of trolleys a reasonably efficient transportation service was available.

Early in the spring about 1200 jitneys were licensed in Providence, 600 in Pawtucket and

passengers than for whom they had seats.

In addition to the regular jitneys, the great majority of which are touring cars with a few regular 'bus types on commercial vehicle chassis, a number of the larger industrial concerns fitted up their trucks with temporary seats and used them to bring employees to work from distant sections and take them home at night.

An ordinance had been passed by the Providence council early in the year requiring bonds of \$5000 for every car, license fees, and prescribing strict regulations. The jitney owners declared



Scenes Illustrating the Jitney's Service During the Street Car Strike in Rhode Island, Showing Types of Jitneys and an Empty Street Car, One of the Extremely Few Operated.

corresponding numbers in the smaller cities. Many of these had abandoned the business because the intense competition had reduced earnings and in Providence because the requirements for license fees and bonds exacted by the Providence council had discouraged them.

But when the strike was declared every car whose owner had a jitney license went on the streets and many cars which had not previously been operated in the service began service. All of the towns which had passed ordinance regulating the jitneys either formally suspended the regulations during the time of the strike or failed to enforce them.

All of the great number of cars brought into service in this way were operated to capacity and more. The operators made excellent returns, for they seldom made a trip without one or two more

that they could not do business under its provisions, and refused to take out new licenses under the arrangement. When the new regulations went into effect, July 8, there was not a jitney running. The people of Providence, however, had shown conclusively that they liked the jitney service and wanted it. So the mayor suspended the action of the ordinance for three weeks, refusing to arrest the drivers who operated in defiance of the law in order to test the matter in the courts.

There was humor in the attempt of the city commissioners of Hoboken, N. J., to regulate the jitney. An ordinance requiring a license fee of from \$100 to \$300 was introduced at a meeting of the commissioners and given to the newspapers. The commission announced a public hearing on that matter three days later.

The publication of the ordinance created some excitement in the city. Its inspiration was blamed upon the Public Service Corporation, which operates the trolleys, and to show its displeasure the public at once began to boycott the cars, which ran empty nearly all day. The jitney men held a big mass meeting, attended by thousands, at which the commissioners were denounced. The crowd demanded to know who had introduced the ordinance. One after another the commissioners denied knowledge of the guilty party. They said the first they had heard of the ordinance was when the clerk read it. The clerk said he had found it on his desk and read it without knowing who had put it there. This comic opera situation seemed to indicate that the commissioners would not pass the ordinance when it came up.

Haverhill, Mass., is one of many New England towns which have been busy regulating the jitney. The unusual feature of the ordinance proposed there is that women are barred from driving cars. The State of Massachusetts licenses women as operators of automobiles.

A new way of discouraging jitney owners, especially those who use their cars for a few hours during the rush period and apply them to private purposes the rest of the time, has been developed in Bridgeport, Conn. There it is required that the jitney sign shall not be removable, but shall be painted on the side of the car. One man, who was taking his wife to a hospital, with the sign painted on the car omitted wearing his jitney badge, as an indication to the public that his car was in private use. He was arrested for the omission and taken into court, where the judge highly praised the policeman who had arrested him. The case against him, however, was nolle.

Two jitney associations operating in Philadelphia and representing about 700 operators, have begun to issue strip tickets at six for a quarter. They are accepted instead of five-cent fares by members of the Auto Service Association and the South Philadelphia Jitney Owners' Association. The two associations have also begun a movement to protect their business politically and prevent the trolley company securing its extinction.

Connecticut registration figures show that 1000 cars in that state have been put into the jitney business during the past few months. The pleasure car lists are smaller by that number of cars and the same number has been added to the "livery" list under which jitneys are registered.

The supreme court of Louisiana has upheld the constitutionality of the ordinance which re-

quires a bond of \$5000 for each jitney operated in the city. The New Orleans Railway and Light Company had gone into the jitney business and each of its 525 cars are effected by the decision. An injunction granted by a lower court at the request of the jitney owners is dissolved.

So popular has the jitney become in the West and Middle West that many of the stronger newspapers have come to its defense. In Spokane the jitney drivers are selling strip tickets for 100 rides for \$3.50. In Vancouver the jitneys have forced a reduction of trolley fare from five cents to eight tickets for a quarter. This has not gained the cars much traffic, as the jitneys have adopted a policy of leaving their stated routes and depositing passengers at their doors.

Checking by the street railway company in Springfield, Mass., has established the fact that the average receipts are \$14.50 for each jitney operator.

Buses operating between New England cities have in many cases adopted the slogan "Carry You for Car Fare." These trips are made for considerable distances as between Hartford, Conn., and Willimantic, Conn., or Providence, R. I., and Boston, and the fares collected range up to \$1.25 for a one-way passage.

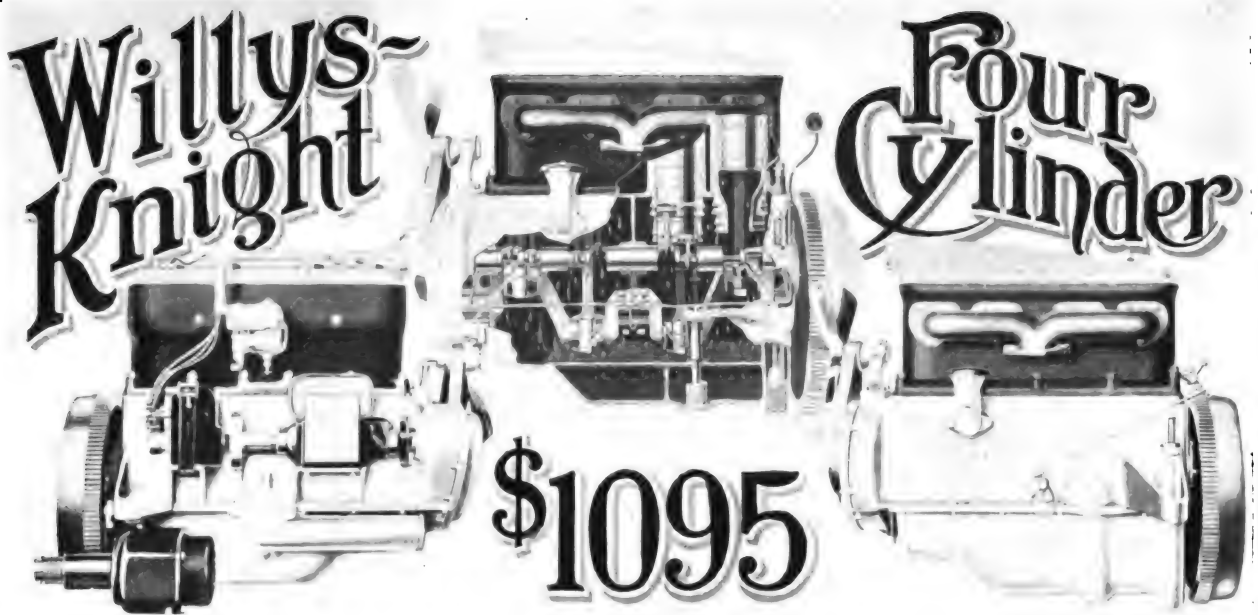
The co-operative 'bus is about to make its appearance in Milford, Mass. The residents of the Purchase section of the city, which has not been well served by transportation, have formed a stock company and will buy a 23-passenger 'bus to supply it. One hundred residents pledged the purchase of a share of stock at \$10 and will submit to a monthly assessment of 25 cents for 15 months.

CHALMERS TESTED IN WINTER.

Three months of winter driving through the Alleghenies and over the steepest and most difficult roads of the East preceded the introduction to the public of the new Chalmers "6-40," with overhead valves and overhead camshaft, which has just been offered at \$1400.

For five weeks and six days nine engineers and testers worked in eight-hour relays putting the car over as much of the worst possible road as they could discover.

Work on the car began two years ago, when C. C. Hinckley went to Europe and there found engineers working on a motor with the overhead type of camshaft, after testing them out on racing cars. Production in Europe was stopped by the war, so the Chalmers was the first company to bring out a stock car with that type of motor.



A CAR equipped with a Knight motor, built in large numbers and sold for \$1095, is the latest development of the motor vehicle industry, the machine being produced by the Willys-Overland Company, Toledo, O. This is the first endeavor to popularize an engine of the non-poppet valve type; one of the chief qualities is silence and smoothness of operation and decided economy of fuel.

The Knight sleeve motor was invented by Charles Y. Knight of Chicago, who organized the firm of Knight & Kilburne and built machines in limited numbers, but the qualities of the engine were neither understood nor recognized in America, and then Knight, despairing of success in this country, went abroad and interested the Daimler company, the English concern manufacturing cars under the license rights of the manufacturers of the Mercedes cars. This company acquired the European rights to manufacture the Knight engine, and later on licensed other builders. Today the Knight motor is very largely used in the higher priced European cars, and is recognized as one of the most efficient types built.

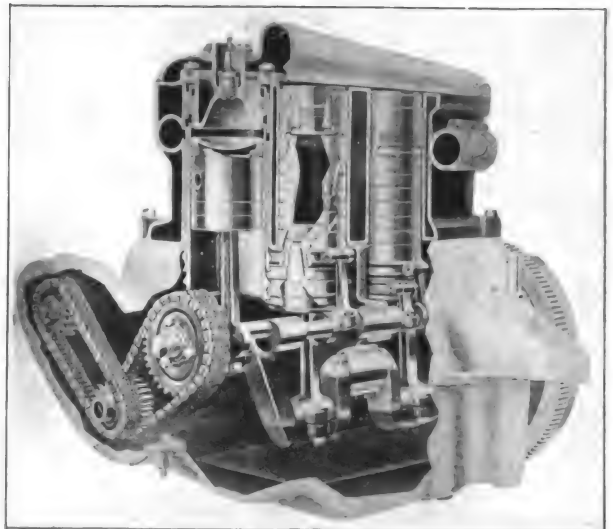
After Knight's success abroad several American motor car manufacturers secured manufacturing rights, and in 1913 the Willys-Overland interests began building the motor in the plant at Elyria, O., in the shops of the Garford company, which was controlled by the Willys company.

The interest of the Willy's organization in the Knight motor began when, after having tried for

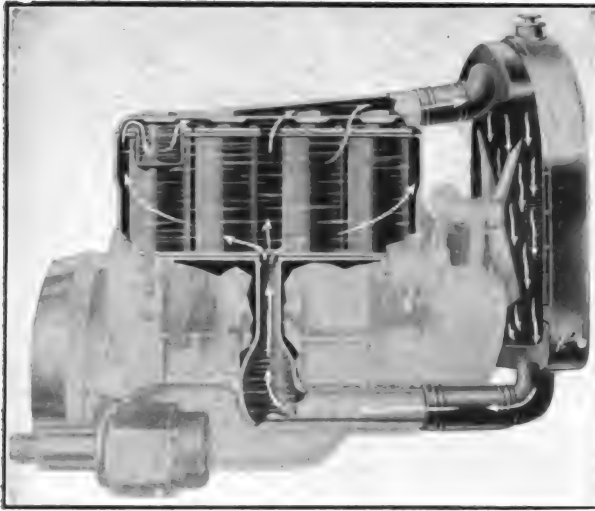
a long time to get the ear of the manufacturer in America, the inventor followed him to Europe and then into Egypt to take up the matter of producing a Knight engined car.

On the Nile, Knight got Mr. Willys interested in the new design and later they went to Europe together and made a long tour in one of the Knight motored cars that had been built by a leading European manufacturer. This led to the production of the first Willys-Knight cars.

The design of the Willys-Knight cars, however, was not such that they could be produced



Section Through Willys-Knight Four-Cylinder Block Motor Showing Silent Drive Through Eccentric Shaft.



Phantom View Through the New Willys-Knight Engine Showing the Operation of the Water Circulating System.

in great quantity and the price for the car last year was \$2475. That car has been completely redesigned and now has little in common with former Willys-Knight cars. It is at the other hand more accurately described as a Knight-motored Overland. The Elyria plant is to be given over entirely to the production of engines and parts for the new car, while the chassis is built and assembled in a separate division of the Toledo plant.

A branch of the factory to be known as the Willys-Knight division has been organized and the sales and production of the car will be carried on separately from the other work done there.

Characteristics of the Knight.

The advantages of the Knight motor which have impelled John N. Willys to undertake its use on a large scale, are the reliability, unusual power, smoothness of operation and economy, which is claimed for it. Its sponsors hold that one of its most important characteristics is that it improves with use and that it is not affected in any way by carbon accumulations that is common to all poppet type engines. Instead of affecting its efficiency, carbon deposits in moderate quantity are said to improve it. It is simple, has

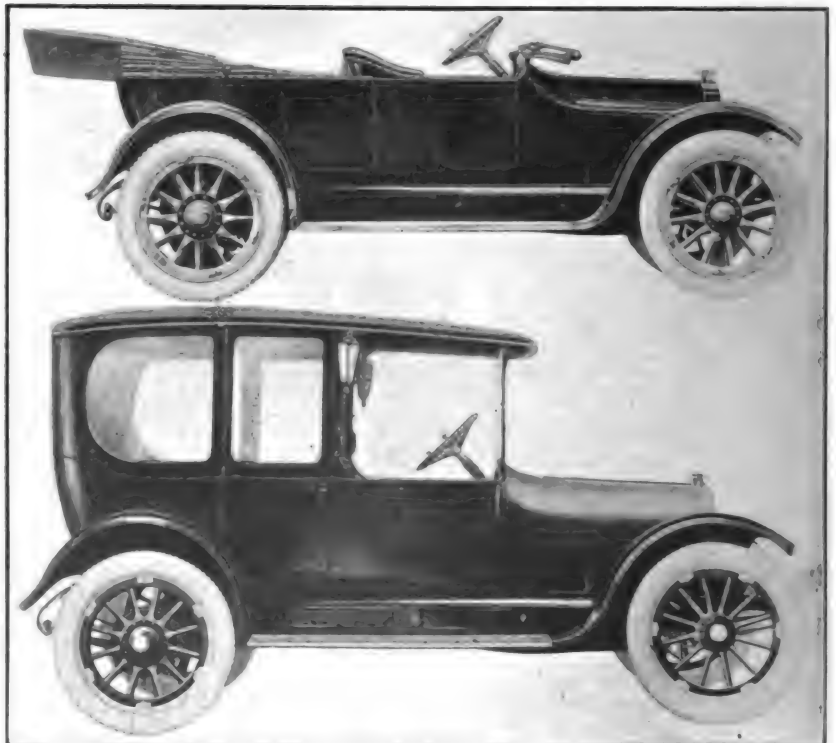
few parts and the action of its valves is as positive as is that of steam engine valves.

The new engine is one of the lightest sleeve valves types that has ever been produced. The cylinders are $4\frac{1}{8}$ inches by $4\frac{1}{2}$. It is rated at 40 horsepower, this being obtained at 1400 revolutions a minute. With practically no falling off in proportionate power, 50 horsepower is obtained at 2000 revolutions per minute, and at 1000 revolutions the curve shows 29 horsepower.

The cylinders are cast in a block and are carried on a two-part aluminum crank case. The sleeves in which the valve ports are located are carried between the cylinder walls and the pistons. There are two sleeves, each working up and down a distance of one inch. This movement is positively accomplished by connecting rods driven at half the speed of the crank shaft.

Near the top of each sleeve are rectangular ports, extending part way around the circumference and on opposite sides. In the side of the cylinder wall there are corresponding slots, the one on the left allowing passage of gas to the exhaust manifold, and that on the right to the intake manifold.

When in the up and down movement of the sleeves the slots on the right side of the sleeves register with the opening in the cylinder wall.



Willys-Knight Five-Passenger Touring Model Selling for \$1095 and the Seven-Passenger Limousine Priced at \$1750.

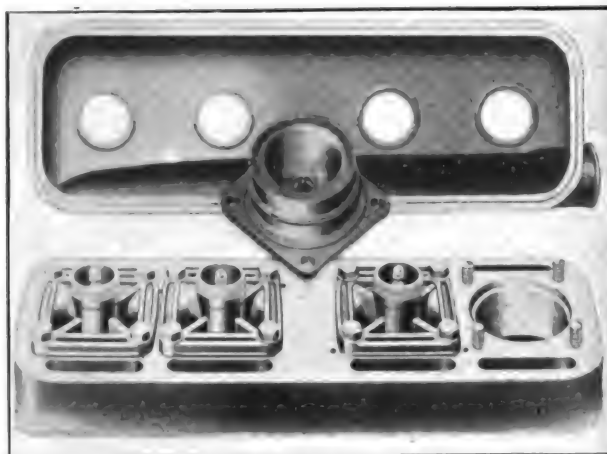
there is a clear passage into the cylinder from the intake manifold and the gas enters. The area of the intake port thus created measures 1.372 square inches, is four inches long and .393 inches high. The exhaust port is $3\frac{3}{4}$ inches long and .410 inches high, giving an area of 1.5875 inches.

Sleeve Travel Is Slow.

The wear on the sleeves is not great since they travel only one inch at a stroke and there are only half as many strokes as the pistons make. The distance travelled by the sleeves is only one-ninth of that covered by the pistons.

The eccentric shaft which actuates the sleeves is driven by silent chain from the front end of the crankshaft. No matter how fast or slow the engine is running, the valves open in identically the same relation to the piston position, insuring the full intake and exhaust of gas at the highest speeds and obviating the difficulties of that nature which may arise in a poppet valve engine when the springs fail to move the poppets quickly enough. The exhaust opens 40 degrees before lower dead centre and closes five degrees after upper dead centre; the intake opens $6\frac{1}{2}$ degrees after upper dead centre and is closed 45 degrees after lower dead centre.

At the top of the cylinder head there are junk rings extending between the two sleeves to prevent loss of compression through that space, and these are effective regardless of the fit of the sleeves. The fit is not tight and the space be-



Detachable Cylinder Head of the Willys-Knight Motor, Showing Spherical Combustion Chamber.

tween the two is taken up by a film of oil.

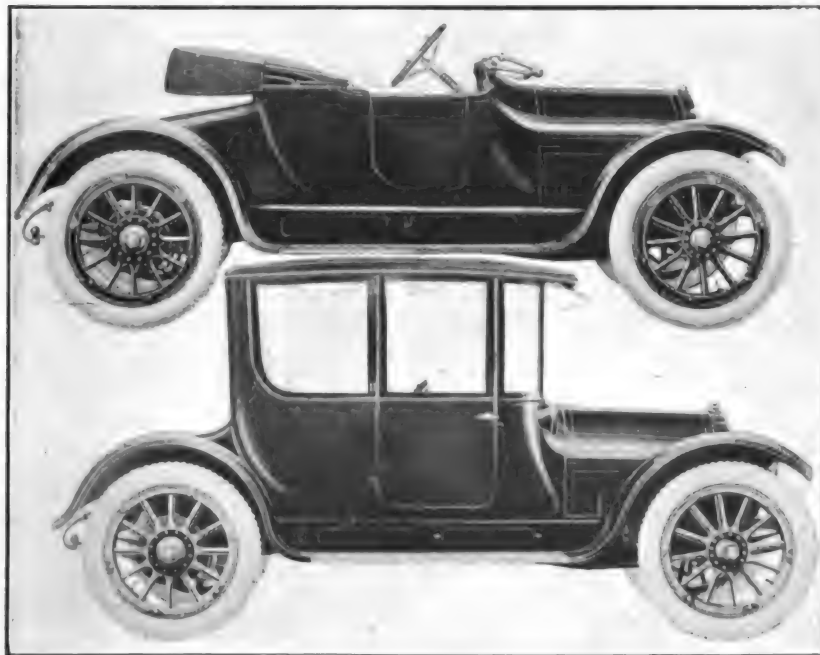
The crankshaft is carried on three main bearings of usual design. All bearings used in the car are of exceptionally ample dimensions. The front crankshaft bearing is $2\frac{1}{2}$ inches long, the centre $2\frac{1}{2}$ and the rear $3\frac{11}{16}$. The diameter of all crankshaft bearings is two inches. The front eccentric shaft bearing is $2\frac{3}{4}$ inches long, the centre $2\frac{1}{8}$ inches and the rear $2\frac{1}{8}$ inches. The diameter of the eccentric shaft bearing is $1\frac{3}{8}$ inches front, and two at the centre and rear.

The pistons have concave heads and the top of the cylinder is concave, so that a near approach to the theoretically desirable spherical combustion chamber is secured. The spark plug is placed exactly in the centre of the head.

Thermo-Syphon Cooling.

There is a separate lead from each cylinder to the exhaust manifold. The intake manifold is cast into the cylinder block and the carburetor is attached directly to the casting. Cooling is accomplished by the thermo-syphon system, with the usual type of Overland radiator and a large ball bearing fan.

The lubricating system is simple. Oil is drawn upward from the reservoir at the bottom of the crank case by a pump operated from the eccentric shaft and is forced through pipes to the crankshaft main bearings, eccentric shaft bearings and chains at the front. The



Willys-Knight Roadster Priced at \$1085 and the Coupe Model Selling for \$1500.

crankshaft webs are drilled, conveying the oil to the lower connecting rod bearings and the overflow from these is thrown into the sleeves and pistons. When it splashes against the skirt of the sleeves it is carried up between them by their own action. Circular grooves cut in the sides of the sleeves insure the distribution of the lubricant.

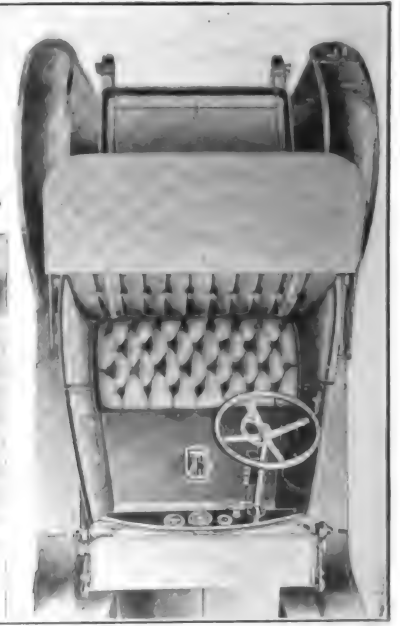
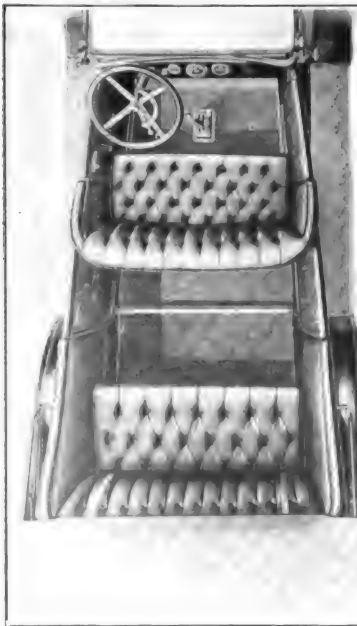
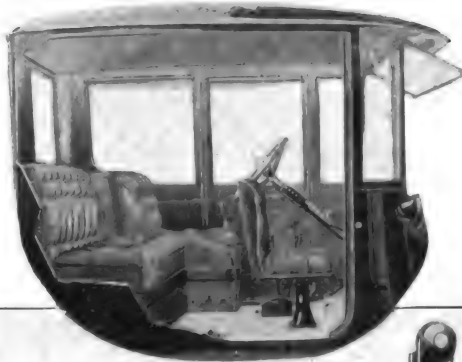
Holes $\frac{1}{8}$ -inch diameter are drilled in the sleeves at intervals, allowing the oil spray below the piston to pass through the sleeves and lubricate the space between them, and to pass through the outer sleeve and lubricate the space between it and the cylinder wall. Suction caused by the intake vacuum tends to lift the oil up between the sleeves.

The amount of oil flowing is automatically taken

which the spark plugs are placed.

On the right side of the motor are three electrical units, providing for ignition, lighting and starting. A silent chain mounted just ahead of the eccentric drive chain drives the generator shaft at motor speed. Back of the generator is the magneto. Both of these units are supported by brackets attached to the crank case. The starting motor is hung below the right rear supporting arm and it drives to the flywheel through the Bendix connection which is used on all Overland cars.

The drive is through a cone clutch of the standard Overland type. There is a three-speed sliding gear set and a full floating rear axle. The drive shaft is fitted with a universal joint at the front end and is enclosed in a torsion tube which attaches at the rear



Views of the Interiors of the Coupe, the Touring and the Roadster Models, a View of the Front Compartment Showing Grouping of Controls.

care of by the connection of an oil by-pass with the throttle. Thus the amount of oil supplied varies directly with the degree to which the throttle is opened. The pump is so constructed that its entire barrel oscillates as it pumps.

At the top of the cylinder there is a separate aluminum plate covering the cylinder block forming the top of the water jacket and the outlet to the radiator. It is held in place by four nuts, which screw down on the tops of the cups in

end of the gear box. The latter is carried on the rear axle as in the other Overland models.

Rear springs are of the three-quarter elliptic type and are underslung from the axle tubes. The spring dimensions are 48 by two inches, while in front half elliptics are used, which are 36 by $1\frac{3}{4}$ inches. The brakes are 14 inches in diameter and the faces are $2\frac{1}{4}$ inches wide.

The bodies are of the latest streamline design. They have symmetrical lines and a long, low, racy effect. The graceful poise of the car is

accentuated by the one-piece cowl dash, gently sloping hood and full curved toneau back. The doors are U shape and hinged at the front, with disappearing hinges. Frame running board brackets and battery box are concealed by mud shields.

The car is finished in Royal blue with ivory striping. The wheels are gray and all of the trimmings are nickelled or of polished aluminum. Heavy crowned steel fenders are black enamelled.

The car has 114-inch wheelbase, which has permitted the use of a body with exceptionally ample room. The seats have high, comfortable backs, while heavily upholstered cushions are built on deep, coiled springs, which give a maximum of riding comfort.

Special attention has been devoted to the interior details of the body. There are large pockets on the inside of all doors, a hinged robe rail and a foot rest. A one-man top of mohair can be easily raised or lowered. The curtains fasten from the inside and are conveniently attached. Their snug fit eliminates flapping. A built-in windshield of the rain-vision type is provided. It can be ventilated and there is a universal adjustment.

In addition to the five-passenger touring car, roadster, four-passenger coupe and limousine bodies are installed on the chassis.

The new Willys-Knight gives every promise of increasing the very large business that has already developed through the offer of a poppet valve four at \$750. Orders on this latter model are said to be now 26,000 ahead of production. In addition to a very large domestic sale, the Knight motored car is expected to find a very active export market.

TIRES AND ROAD SURFACES.

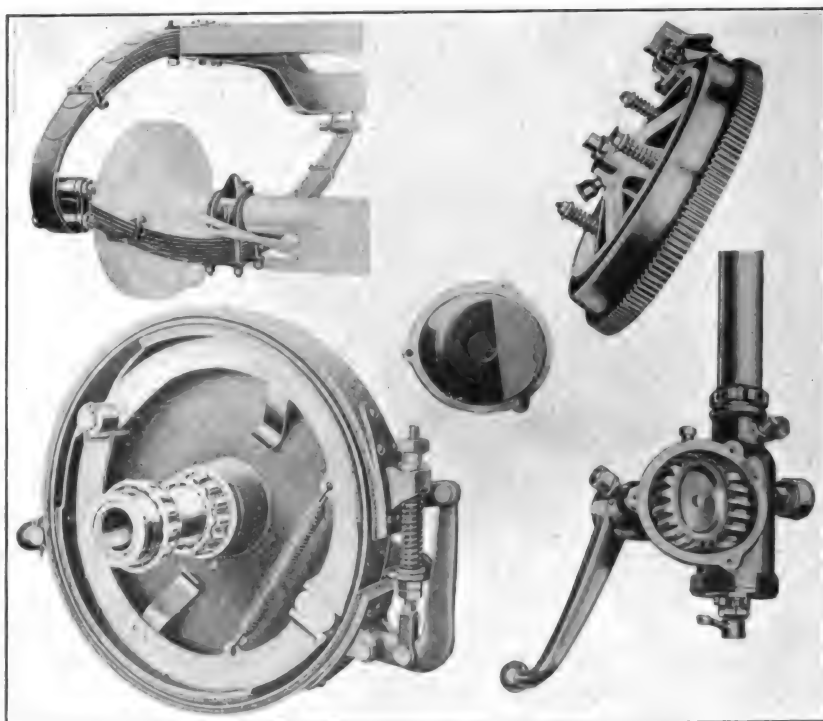
Comparison of tire mileages attained by solid tires on American trucks and on London motor 'busses operating over the perfect streets of the English metropolis give a striking insight into the effect of good road surfaces on tire economy.

Whereas from 7000 to 10,000 miles is about

the usual performance of tires on American roads, with a very rare occasional record approaching 20,000 miles, mileages of up to 30,000 miles are not unusual in London, and cases have been known where tires have gone as much as 50,000 miles.

It may be that English tires in which the proportion of rubber is slightly greater are a shade superior to the American product, but that is by no means certain. But without doubt the overwhelming influence is the better condition of the roads.

This is shown conclusively by the fact that on the cut up roads near the front the European



Group View of the Spring Assembly, the Brake Drum, the Clutch and the Irreversible Steering Gear Assembly.

tires used on military trucks have often worn out at less than 5000 miles.

The Cole Motor Car Company, after placing a number of eight-cylinder chassis for use in funeral cars, has found that a sufficiently large demand for that type of car exists to justify making it a regular feature. The funeral chassis is similar to the other eight chassis except that it has a longer wheelbase.

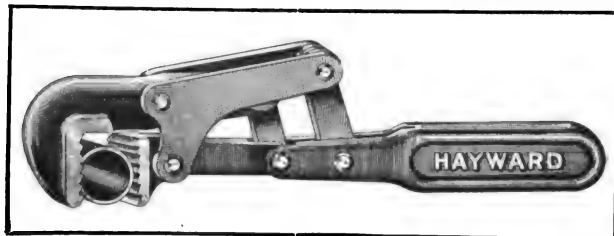
In 1909 the Goodyear Tire and Rubber Company made 102,669 automobile tires. In 1914 that number had grown to 1,478,396.

CAR ACCESSORIES AND EQUIPMENT.

HAYWOOD PIPE AND NUT WRENCH.

This Tool Automatically Adjusts Itself to Any Size Pipe or Nut Within Its Capacity.

The Haywood Wrench Company, 700 Cass avenue, St. Louis, Mo., is the manufacturer of the Haywood automatic pipe and nut wrench shown in the accompanying



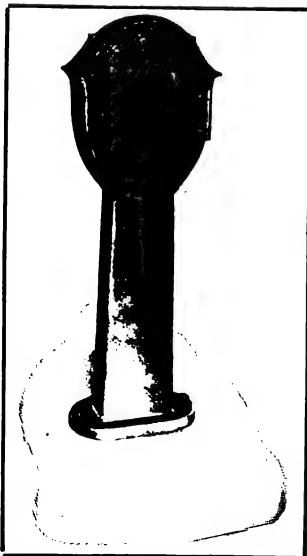
Haywood Pipe and Nut Wrench.

illustration. The wrench is automatic in action, instantly adjusting itself to all pipes or nuts within its capacity. This is accomplished by an arrangement of levers which can be readily understood by referring to the sketch. This device is convenient and economical of time. It cannot crush the pipe, yet the harder one pulls on the handle, the tighter the jaws grip the object. The wrench is strong and durable, being made from the best quality high carbon drop forged steel, and is fully guaranteed. Three different sizes are made, the seven-inch length having a jaw capacity of $\frac{3}{4}$ inches, retails at \$1.25. The 11-inch size will receive objects up to 1 $\frac{1}{2}$ inches and sells at \$1.75. The largest size is 14 inches in length, the jaws opening up to 1 $\frac{1}{2}$ inches, sells for \$2.25. Dealers will do well to investigate this product

LIPMAN CURB OUTFIT.

Latest Lipman Product Is a Combined Trade Attracting Device and Serviceable Air Stand.

"Free Air" is a slogan that is sweeping the ranks of the motoring world, and is becoming an insistent demand on the part of the automobile operator. The manually operated air pump is fast disappearing and in its place is coming power driven pumps that eliminate the necessity of physical labor in maintaining pressure in tires.



Lipman Curb Outfit for Free Air Service.

To meet this demand for free air and at the same time to afford the dealer some recompense by attracting paying trade to his garage, the Lipman Air Appliance Company, 199 Pleasant street, Beloit, Wis., is manufacturing a curb air stand that not only gives adequate service, but combines trade-attracting possibilities. At the top of the stand bosses are provided, so that the dealer can attach a sign.

The stand, an upright, and to be seen from a considerable distance, is ornamental. It is cast in Old Colonial design in heavy gray iron and finished in gray enamel with gold lettering on a black enamel background. It is provided

with a large shut-off valve, an accurate and easily read gauge, and 15 feet of hose with tire connections.

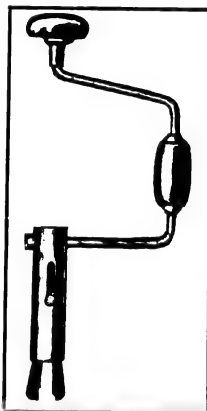
Further particulars regarding this curb outfit, as well as the other products of the company, can be obtained by writing to the manufacturer and mentioning this publication.

TIRE PUMP AND RIM WRENCHES.

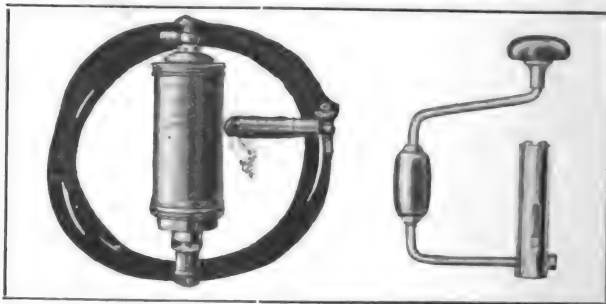
Quality Equipment Which Affords Convenience to the Motorist; Spark Plug Pump Will Produce Any Pressure.

Two products of the Hill Valve Pump Company, 18-20 East Kinzie street, Chicago, Ill., are the motor driven tire pump and demountable rim wrench illustrated herewith. The pump is of large size and adaptable to any type of engine. It is compact, made of polished brass, nickel and blue steel. Attachment is made to a spark plug opening. It will produce any desired pressure. With this equipment the Utility automatic Pneu-Meter, which prevents over-inflation, is furnished. This device automatically cuts off the air supply when a predetermined pressure has been reached and instantly notifies the operator by producing a whistling sound. This is high-grade equipment throughout and retails complete at \$10. The Pneu-Meter will attach to any pump and sells separately for \$2.

The Utility demountable rim wrench is shown in two illustrations and is especially convenient for removing the retaining bolts of the rim, although there are several more purposes for which it may be used. The wrench is self-adjusting. It is placed over the nut and when pressure is applied the jaws automatically grip the nut. Once the wrench is set the jaws will not loosen, but retain the nut after removal, so that it cannot fall or become lost. The lever arm is shaped like a bit stock, so



Utility Demountable Rim Wrench.



Utility Tire Pump and Pneu-Meter and Rim Wrench Folded.

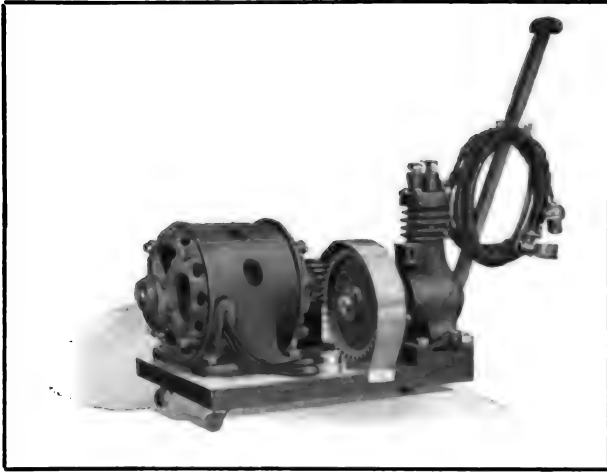
as to allow the use of both hands. The tool may be folded, as shown when not in use, and conveniently carried in the tool box. The retail price is \$1.50.

GARDNER MIDGET GARAGE OUTFIT.

Equipment for the Garage or Repair Shop Which Will Inflate a 36x4 Tire to 90 Pounds in Almost Two Minutes.

The "Midget" private garage set, illustrated herewith and manufactured by the Gardner Governor Company, 126 Williamson street, Quincy, Ill., is a portable outfit designed to be moved easily to any point of the garage where it may be desired. The chief component is a

"Gardner "Midget" pump, which is geared to a quarter horsepower electric motor. The outfit is mounted on a bed plate, which is provided with casters for trundling about. Included in the set are eight feet of air hose,



Gardner Midget Garage Outfit.

equipped with tire connection and gauge, and 15 feet of lamp cord and plug for the attaching to an electric light socket. The makers claim that this equipment will inflate a 36x4 tire from flat to 90 pounds pressure in a little over two minutes. When an alternating current motor is installed the outfit retails at \$75, and with a direct current motor, at \$70.

JOHNSON'S PREPARED WAX.

A Prepared Wax Which Cleans, Polishes and Weather Proofs Automobile Bodies, Fenders and Hoods.

S. C. Johnson & Son, Racine, Wis., nationally known as a manufacturer of a high quality wax for the polishing of the finest finished furniture, floors, pianos, etc., is marketing a prepared wax that will thoroughly renovate the body, fenders and hood of any automobile. Actual tests have proved that even the poorest paint and varnish job may be so improved as to equal the work of an expert painter. A quality of merit possessed by this wax is that all blemishes and cracks are filled up and concealed. Further cracking or checking is absolutely prevented by the hard, dry film which forms, and to

which dust, water, etc., cannot adhere. The manufacturer also lays emphasis on the fact that the surface produced is impervious to finger marks. The wax is very easy to apply, it being in paste form. The best results are obtained when an interval of a half hour is allowed between coats, each being



Johnson's Weather Proof High Gloss Wax.

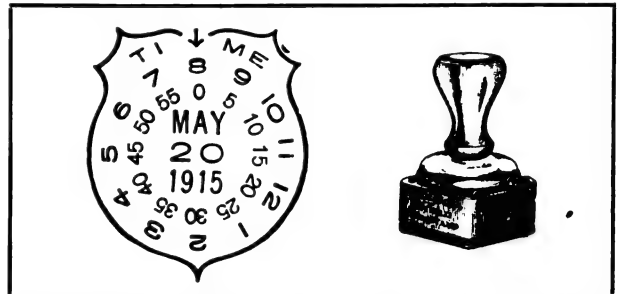
polished well before adding another. By cutting out the coupon appearing with the Johnson company advertisement on another page, and forward-

ing it to the company with 10 cents, a sample can of wax sufficient for one application on a large car will be sent prepaid by parcels post. A can containing a larger quantity may be obtained from most dealers for 25 cents, while a pint can, containing enough wax for a season's use, is retailed at 60 cents.

HOGGSON POCKET TIME STAMPS.

Recorders Adapted to Garage and Repair Shop Service Which Keep an Absolute Check on Many Operations.

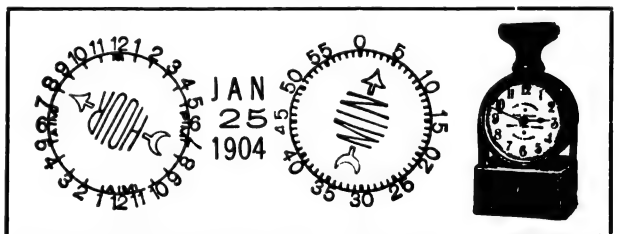
The keen competition of business demands that the employer shall keep a check on every minute of the working period in some manner so that a proper charge



Impression of Model Shield Hoggson Time Stamp and the Stamp.

may be made. The S. H. Hoggson & Co., Thames and Goodrich streets, New York City, is manufacturing time stamps that are particularly useful in garages and repair shops. They can be utilized to record the operations of the workmen, arrival and departure of cars and persons, time of telephone calls, and invoices may be stamped so that the exact hour of arrival can be determined at any future period. There are many other purposes for which these stamps may be used with good results.

Hoggson stamps are made in three types, they being known as the model D, model S and model Shield. Model D, which is 3 1/4 inches in height, and shown in the accompanying illustration, is also useful as a bench clock, the dial being visible. A two-dial impression, with the



Impression of Model D Hoggson Time Stamp and the Stamp.

date between the two, as illustrated, is produced by pressing the knob at the top. The left dial is divided into 24 hours and the right dial into 60 minutes, and the hours are divided into A. M. and P. M.

Model S is of the same design as model D, the difference being that the date and time are printed within an inch circle, surrounded by a shield. This stamp is spaced for 12 hours, which is sufficient for the average working day. This stamp does not show the clock dial and though it prints a stamp smaller than the model S, the time is easily read.

If desired, decimal minute dials may be furnished for the stamps, so that the fractions of an hour may be computed instantly. Model D retails complete with ink pad and set of dates, with any desired inscription on the die plate, at \$15. The shield stamp is sold complete with dates and ink pad, either plain or inscribed, for \$5. Special inscriptions may be obtained if desired for an extra charge of \$1.

PRACTICAL MOTOR CAR REPAIRS.

A TOOL chest is not locked unless each drawer is firmly secured. An automatic device that will prevent the drawers from being left unlocked

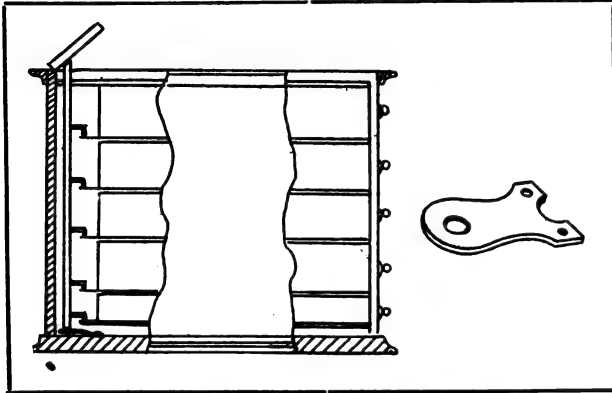


Fig. 66—Arrangement for Automatically Locking a Tool Chest Made of Curtain Hangers and Hooks.

when the cover is closed down can be made from simple materials, as shown in Fig. 66. Ordinary curtain shade hangers are flattened out and one attached to the rear of each drawer. Hook screws, such as are ordinarily used for retaining lace curtain hangers, are screwed into a strip of hard wood, taking care that the screws are the same distance apart on the wood as the shade hangers are on the back of the chest. A flat spring is fastened under the strip at the bottom of the chest. When the cover is down the spring is depressed and the hooks forced through the eyes of the curtain hangers. When the cover is raised the spring forces the strip upward, removing the hooks from the eyes in the hangers. The cover may be locked down with a padlock or one of any other type.

HOME-MADE GARAGE HOIST.

A hoist is an essential in every garage and in Fig. 67 A is shown a type that anyone can make at a trifling expense. It can be moved to any part of the garage where there is a convenient ceiling or roof joist. The material required is two hooked pieces and three rings, two of which are oval and the other round. The hooked pieces should be made from steel not less than two inches in width and a half inch thick. Half-inch holes should be drilled three-quarters of an inch and three inches from the end. The first are fitted with the links, while the hinge pins fit into the latter. The hooks are clamped on the joist

or beam, the points being driven in with a hammer. A tight hold is assured, for the greater the strain the deeper the hooks will sink. The strength of the parts should be adapted to the work the device will have to perform.

A HANDY HOME-MADE VISE.

An easily constructed vise which may be used to advantage in the garage, consists of a discarded monkey wrench held firmly on a small block by two L shaped pieces of metal riveted to the stationary jaw of the wrench on one arm and to the block on the other. The handle is secured by a staple, seen in Fig. 67 B. The movable or inside jaw of the wrench is used for clamping and may be operated by the knurled nut attached to the long screw, or the leverage may be greatly increased by drilling two holes at opposite points in the nut so that a small rod may be used as a lever.

ASCERTAINING WIRE DIAMETERS.

A simple method of determining the diameter of a wire when no gauge is at hand, is to wind the wire closely around an object until the coils completely cover its surface for one inch. Count the coils and divide the distance by that number. Thus if there are 16 coils to an inch, it is apparent that the wire is 1/16 of an inch in diameter. This method is successful if carefully carried out even with very fine wires, and is illustrated at Fig. 67.

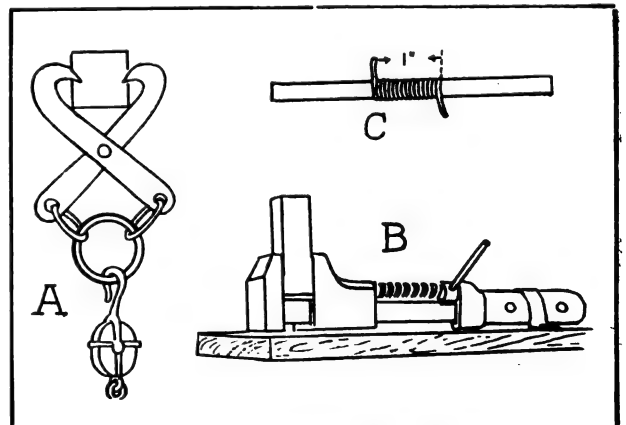


Fig. 67—A, Hoist Which Grips Roof Joist; B, Small Vise Made from Monkey Wrench; C, Method of Determining Wire Diameters Without Gauge.

CORRECT METHOD OF USING A TAP.

Many tap wrenches are broken by motorists because they are used incorrectly. The wrench is gripped at the extreme ends with both hands shown in Fig. 68 A. This is bad practise, for should the tap vary from the centre of the hole it cannot be readily detected and is likely to be broken. The machinist avoids that result by placing his right hand on the centre of the wrench so that the tap divides his fingers. The left hand is placed on the end of the wrench and applies the motive power. This is illustrated in Fig. B. Any variance in the position of the tap can now be detected.

EASILY CONSTRUCTED PIPE WRENCH.

It is often found necessary to remove studs and smooth pipes from the machine. Of course an operation of this kind requires a pipe wrench or some other tool that will bite into the metal.

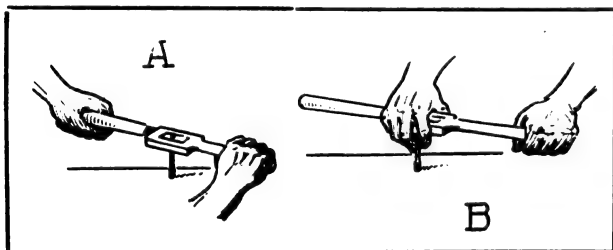


Fig. 68—A, Incorrect Method of Handling a Tap Wrench; B, Correct Method.

When such a tool is not at hand a practical substitute can be easily made, as shown in illustration Fig. 69 III. A discarded three-cornered file should be placed in an ordinary monkey wrench behind the part to be moved. When pressure is applied, the edge of the file will bite into the surface of the piece and force it to move. It is often found advisable to break the file so that a two-inch section may be obtained.

SOLDERING A WATER JACKET.

If the pressure to be withstood is not too great a crack in a cylinder water jacket may be repaired by soldering. Some copper sulphate or blue stone is dissolved in water and the sides of the crack are painted with it several times until a coating of copper begins to appear. This surface will retain solder and usually that will make a very satisfactory repair.

HOME-MADE VALVE SPRING TOOL.

The valve spring tool shown, Fig. 70 A, can be made best from a piece of $\frac{1}{2}$ -inch round stock.

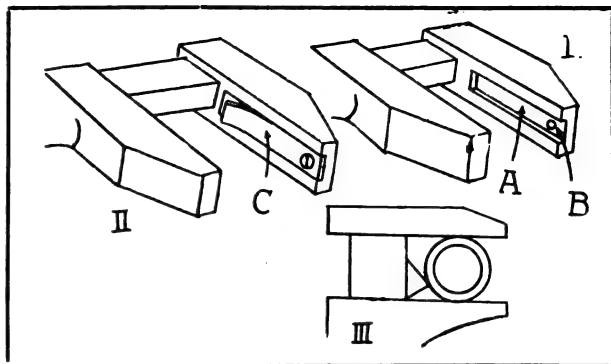


Fig. 69—I, Jaw Slotted for Spring; II, Spring Attached Prevents Nuts from Dropping; III, Broken Three-Cornered File Used in Conjunction with Monkey Wrench for Turning Smooth Surfaces.

The ends are flattened and a $\frac{3}{8}$ -inch U opening is formed. The tips can be made tapering by means of a file, so that they may be easily forced between the coils of a valve spring, as shown at B. Dimensions can be changed to suit the work.

NUT HOLDER FOR MONKEY WRENCH.

In the process of removing a nut with a wrench it is frequently dropped and becomes lost. This can be obviated by the simple attachment illustrated in Fig. 69. A groove (A) is cut in the stationary jaw of the wrench and a small hole (B) drilled and tapped near the outer edge. A spring (C) made of good steel should be attached to the jaw as illustrated. This spring will hold even the greasiest of nuts until the jaws are released.

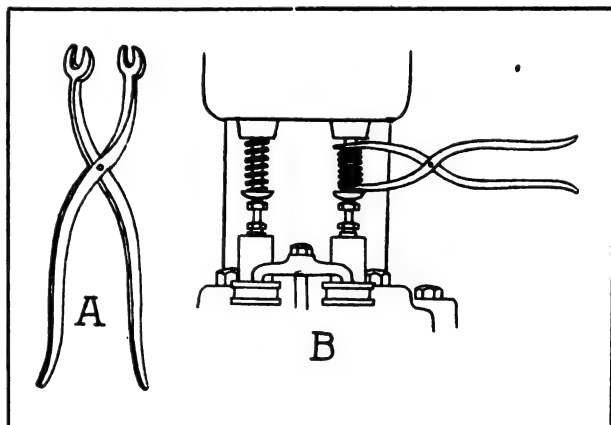


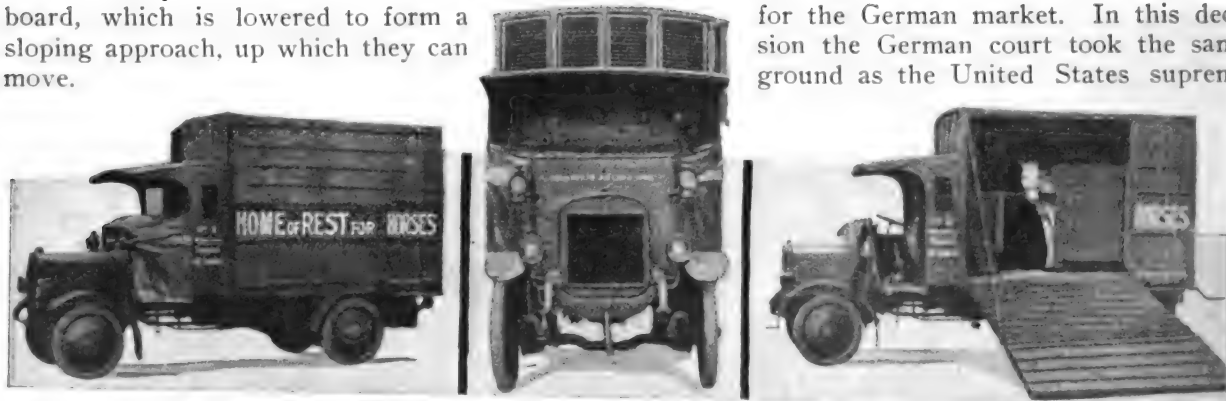
Fig. 70—A, Construction of Valve Lifter; B, Method of Applying Lifter.

MOTOR AMBULANCES FOR HORSES.

In addition to relieving the horse of much of the most arduous work of war, the motor ambulance has come to its rescue when injured on the firing line. The allied armies have a number of motor trucks with comfortable covered stalls built upon them in which wounded horses are carried to the base veterinary hospitals.

Many of these ambulances have been built and presented to the governments by European organizations, which correspond to our own Humane Society. Several that are in use in the English army are mounted on English Commer car, four-ton chassis, and the van bodies in which there are stalls for horses are the finest types of body work of the kind.

Each car will carry two horses. The stalls are divided, keeping the animals separate and providing plenty of room. The horses get into the vehicle by means of a rear or side board, which is lowered to form a sloping approach, up which they can move.



Motor Ambulances in the British Army for Conveyance of Wounded Horses from Firing Line to Base Veterinary Hospitals; Supplied by the Home of Rest for Horses.

The body may be entered by a man through sliding doors in the front wall immediately behind the driver's seat. There is a manger in the centre of the forward partition. A forage locker is immediately below the manger. Four grated windows keep the inside well ventilated. Block and tackle is provided for letting down the runway, on which the horse enters the car. In short, every convenience and comfort has been provided for the horse.

AMERICAN OPPORTUNITY IN RUSSIA.

Great opportunity for American business development in Russia is declared to exist by W. V. Logan of the Goodyear Tire and Rubber Company, who has just returned from that country. Germany has supplied a great part of Russia's manufactured goods, but that supply is cut off by

the war and the feeling now being engendered will probably for a long time prevent the purchase of German goods by Russians.

When the war started there were only 12,500 motor vehicles of all descriptions in Russia. The government has since purchased from \$15,000,000 to \$20,000,000 worth, and much of this has been of American production. American cars and trucks are now well known there, and should, in a measure, be greatly in demand when the war is over.

GERMAN COURT UPHOLDS PATENT.

The German Reichgericht, the supreme court of Germany, has rendered a decision declaring all automobile tire chains that creep along the wheels to be infringements of the Parsons patent, under which Weed anti-skid chains are manufactured in America. Romain Talbot of Berlin, manufactures chains under the patent for the German market. In this decision the German court took the same ground as the United States supreme

court in suits brought here.

TWELVE-CYLINDER PERFECTED.

Shortly after the Indianapolis race Ralph De Palma drove a "Twin Six" Packard from Chicago to Detroit in 8½ hours running time, in spite of washouts and similar difficulties. The trip was made at night. The car is equipped with the Delco ignition system and E. A. Deeds, president of the Dayton Engineering Laboratories, thinks it the best proof that the Delco system is capable of meeting all requirements.

Only four of the old fashioned family carriages were returned recently in Columbus, O., for taxation. Columbus is a city of 225,000 people. Hundreds of such carriages, now replaced by motor cars, were formerly taxed there.

INTERNATIONAL ADDS NEW MODEL.

THE latest and largest type of truck built by the International Harvester Company at its Akron plant is rated at 2000 pounds and is designated as model F. This is the third type produced, the first two being 1000 and 1500 pounds, and having two-cylinder motors. The motor of the new model has four cylinders, and is designed to give an abundance of power with minimum fuel consumption. The radiator is protected thoroughly by being placed in combination with the dash behind the engine. The shaft and internal gear drive is employed, the rear axle being the Torbensen, standard model R-1.

The motor is a four-cycle, water cooled, L head, vertical type, cast en bloc, with bore of $3\frac{1}{2}$ inches and stroke of $5\frac{1}{4}$ inches, which gives by the S. A. E. formula a rated horsepower of 19.6, though the maximum production is claimed to be above 25. Three main bearings are used, and the crankshaft is $1\frac{3}{4}$ inches in diameter and is mounted on babbitt bearings. All the valve mechanism is enclosed by cover plates that are easy to remove. Timing gears are helical cut, and they drive the single camshaft. The water pump and magneto are driven by a cross shaft carried on the engine case ahead of the cylinder block.

Cooling is by a circulation of water through the large water jackets and the vertical tube radiator from a centrifugal pump. A fan promotes radiation. Lubrication is by splash and force feed, the oil being drawn from the reservoir by a gear driven pump and forced under pressure to the main bearings and timing gears, the overflow returning to troughs in the crankcase. Ignition is by a Bosch high-tension system. The carburetor is an automatic float feed type, with adjustable hot air supply. A hood of the Renault type covers the motor.

The clutch is a leather faced cone with springs to insure easy engagement. A selective sliding gear type of transmission gearset is employed. Speed ratios are three forward and reverse. A large tube driving shaft with universal joints at

either end is coupled to the pinion shaft of the Torbensen internal gear rear axle by a telescopic joint that insures against end thrust.

The frame, constructed of pressed steel channels, has four cross members and is strongly braced and reinforced. It is suspended on semi-elliptic springs. The wheels are an artillery type, of wood, 36 inches in diameter, and shod with solid tire bands, though pneumatic tire equipment is optional.

Service and emergency brakes are external and internal, respectively, operating on the rear wheels. Control is by the usual ignition and throttle levers on the steering wheel, by foot pedals operating the clutch and service brake, by



The New Model F 2000-Pound Capacity Four-Cylinder Internal Gear Driven International Truck, with Express Body and Driver's Cab.

a foot accelerator and gear and shifting and emergency brake hand levers in the centre of the foot-board. The truck is operated from the left side.

The wheelbase is 128 inches; chassis length over all, 173 inches, and the length, including the body, is 198 inches.

The height of the platform without load is $34\frac{1}{2}$ inches, and 32 inches when loaded. The inside dimensions of the open express body shown in the illustration are 108 by 44 by 12 inches, the flareboards being six inches wide.

The chassis is equipped with upholstered folding, divided seats, with lazy backs. Standard equipment includes two gas head lamps, oil dash and tail lamps, Prest-O-Lite tank, horn and tools.

There were 190 automobiles and 85 motorcycles licensed in the Canal Zone on June 12.

ALLEN DISTRIBUTORS CONVENE.

A convention of distributors of Allen motor cars was held at the factory in Fostoria late in June. Dealers from all over the country were present. A banquet was a feature of the gathering and for this a finely printed menu on paper, made in imitation of birch bark, was provided. This carried the name of every distributor, with humorous verse and personal references that proved to be amusing.

At the general meeting of the convention, L. A. Sommer, chief engineer and factory manager, discussed the clutch, motor and transmission and general design of the 1916 Allen chassis; J. L. Palmer explained the Westinghouse starting, lighting and ignition system; H. K. Reinoehl discussed the design and construction of the car from the technical standpoint; E. P. Kirchofer



Allen Dealers from 15 States Assembled in Convention at Allen Factory at Fostoria, O.

gave a talk on Allen service and brought up some new ideas that will be put in force during the coming year; H. E. Longfellow explained in detail methods of trimming the car and manufacturing the tops.

At the banquet President E. W. Allen acted as toastmaster; Judge George E. Schroth of Tiffin, O., spoke on "Politics;" L. A. Sommer on "Factory Management in Its Relation to the Dealer," and a number of dealers made replies to the addresses of the officers of the company.

The entire party was taken to the motor and transmission factory of the company at Bucyrus, O., making the trip in Allen cars. W. N. Baker, manager of that plant, entertained the distributors at dinner in the Hotel Alberson, Bucyrus, which was followed by funny stories and speeches by the guests.

The convention was regarded as a complete success, and is expected to accomplish a great deal in accelerating Allen sales during the next year.

REMARKABLE MOTOR RECORDS.

The consistent performances of the engines used in cars competing in the recent motor races has occasioned much talk. At Chicago, only one car of the first 10 to finish developed any kind of engine trouble. Burman had to change spark plugs on two occasions on his Peugeot, which is said to have been due to lack of oil. It is said that Wilcox, in a Stutz, had excellent prospects of finishing within the money, if not carrying off the premier prize, had he not been eliminated through a broken piston on his Wisconsin motor.

This make of motor in the other two Stutz cars gave excellent service. Cooper and Anderson romped through the 500 miles at 95 and 93.90 miles per hour, respectively, without the slightest trouble. This is consistent with past performances of Wisconsin motors and Stutz cars. At Indianapolis Anderson brought in his Stutz, as the first American car to finish, at the rate of 87.6 miles per hour; Cooper drove a Stutz, the second American car to finish, at 86.19, and Wilcox, in a Stutz, made 79.66 miles per hour.

The Stutz driven by Cooper at Tacoma showed the same consistent service, the Wisconsin motor not once giving trouble in the 200-mile Golden Potlach, in which Cooper finished second at 84.86 miles per hour.

Two others of the Wisconsin motor performances are noteworthy. It was that engine that made it possible for Barney Oldfield to win the Los Angeles to Phoenix desert race of 696 miles in 23 hours in a Stutz. E. G. Baker established a transcontinental record in a Stutz "Bearcat," equipped with the Wisconsin motor, by driving from San Diego to New York City, a distance of 3728.4 miles, in 11 days, seven hours and 15 minutes. He used 352 gallons of gasoline, averaging 10.6 miles per gallon, and $8\frac{1}{2}$ gallons of oil, or 440 miles per gallon. Size of motor was $4\frac{3}{4}$ by $5\frac{1}{2}$ inches. The performance of the Wisconsin in pleasure car and commercial truck service has been equally consistent.

SUGGESTIONS FOR THE FORD CAR OWNERS.

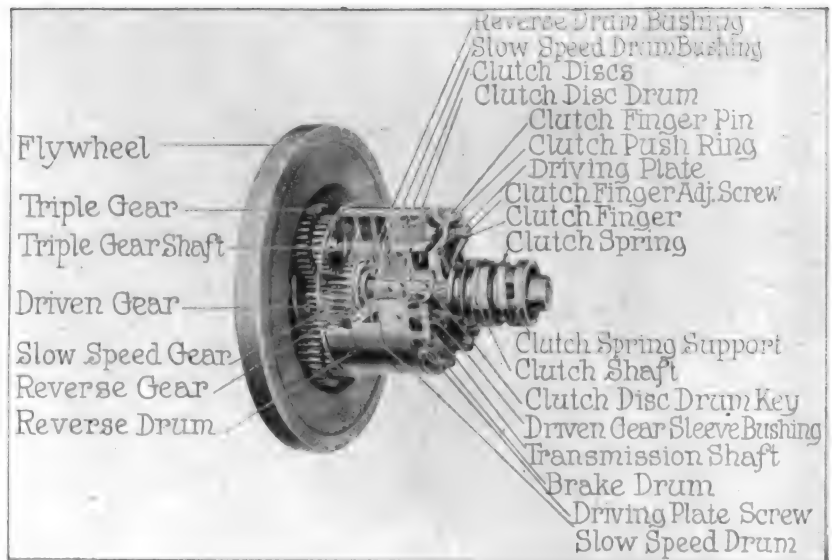
Description of the Special Form of Planetary Gearset Used in the Power Transmission System and the Several Ratios of Vehicle Speed Obtained.

The 28th article dealing with the construction, operation, maintenance, care and repair of the model T Ford chassis is devoted to the consideration of the special characteristics of the planetary gearset in the power transmission system, and the manner in which the several ratios of speed are obtained.

THE elementary principles of planetary gearsets and the need of more than one ratio of vehicle speed were considered at length in the previous installment, a brief review of these being necessary for the reader to understand the functions of the special construction by which the power is transmitted to the rear wheels in the Ford machines.

The Ford gearset differs from this construction in that it has no internal gears, as are indicated in the accompanying drawing, the same operation being obtained by the use of all spur gears that are mounted on several tubes operating on the outside of a shaft, the drums being carried at one end and the gears at the other ends of the tubes. Reference to the illustration of the Ford gearset showing the different parts of the gearset will show that the flywheel is utilized to carry the pinions which are mounted on three studs. These pinions each have three different series of teeth. The shaft attached to the flywheel carries a pinion that is in turn keyed to a tube that extends nearly the whole length of the flywheel shaft. This pinion, sleeve and the drum will revolve on the flywheel shaft if not retained, but when assembled this pinion meshes with the first or forward series of teeth of the triple pinions. On this sleeve are carried two sleeves, each of which would be free to revolve, the forward ends of the sleeves being cut as pinions, and the rear ends of the sleeves carry drums. The pinion of the second surrounding sleeve or tube meshed with the second series of faces of the triple pinions, and the pinion of the outer sleeve meshed with the third series of faces.

Referring to the illustration of the gearset components, one will note that the outside sleeve of the gearset is the shortest and this carries a drum and the largest pinion. This meshes with the smallest faces of the triple pinions. This is the reversing mechanism. The middle sleeve also carries a drum and the smallest pinion, which meshes with the largest faces of the triple pinions. The inner sleeve carries a drum. This sleeve projects through the other two sleeves and to it is keyed a pinion that meshes with the intermediate faces of the triple pinions. The inner sleeve and the pinion will revolve free on the fly-



Sectional View of the Ford Planetary Gearset and Clutch, Removed from the Case, with All Gears in Mesh.

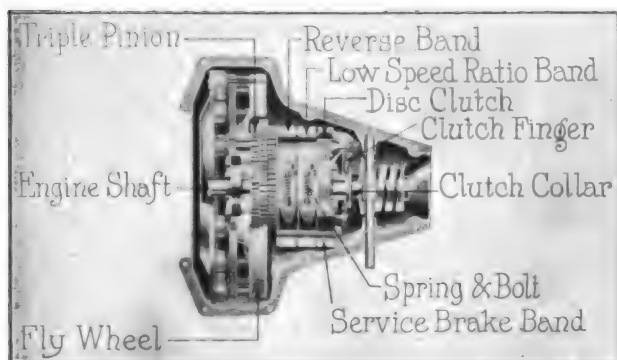
wheel shaft and the other sleeves will revolve on the inner sleeve. That is, the inner sleeve can turn on the shaft in either direction when necessary, and the other two sleeves will turn or can be held stationary, one at a time.

Its Practicality in Operation.

The flywheel is bolted to the flange of the crankshaft and when the engine is turned the flywheel and the studs and the three triple pinions will revolve with it. As the engine turns the three triple pinions will carry with them in the same ratio the pinion on the flywheel shaft, to which is keyed the inner sleeve and which car-

ries the brake drum. On the flywheel shaft, back of the inner sleeve, is a hub or spider that is secured to the shaft by a set screw. This is practically enclosed by the brake drum. On this hub is secured a series of steel discs that must revolve at engine speed. Within the brake drum and placed alternately between the discs attached to the engine shaft are a second series of steel discs. These discs are the clutch. Still further back on the flywheel shaft is a sleeve with a spider at the forward end, the ring of which is secured to the brake drum by bolts. This sleeve will revolve on the engine shaft and the rear end of the sleeve is squared internally to make a telescopic engagement with the stub shaft of the universal joint.

The spider of this sleeve, which is known as the driving plate, carries three levers that are pivoted equidistant about the circumference, the ends of which are centred close to the sleeve and



Semi-Sectional View of the Ford Planetary Gearset and Clutch from the Top.

which contact with a double collar on the sleeve. Between the steel discs and the driving plate is a metal ring carrying three studs that project through holes and against the three lever arms. The collar on the sleeve is keyed so that it turns with it and this collar is slidable on the sleeve, the tension of a heavy helical spring constantly pressing it forward. From this sleeve backward there is no reduction of shaft speed, there being varying ratios for the driving pinion and the master gear of the differential assembly.

Speed of the Main Driving Shaft.

From what has been stated it is evident that the speed of the driving shaft is always that of the brake drum, because the driving shaft is coupled direct to the drum, and that the speed and direction of movement of the brake drum is dependent, unless the drive is direct or high, upon the movement of the pinion mounted on the engine shaft and meshing with the three triple

pinions. By reference to the illustration one will note that the rear drum of the three is the brake, this operating directly upon the driving shaft, and the middle drum controls the low speed ratio.

When the low speed drum is held stationary and the flywheel is revolved, the three triple pinions must turn in a direction opposite to the movement of the flywheel, and these pinions will cause the pinion coupled to the brake drum sleeve to revolve in the same direction as the flywheel, but at a slower ratio. The brake drum necessarily carries with it the driving plate and the sleeve on the rear end of the engine shaft, and the movement of the driving shaft is relatively lessened. The reader will note that the drive is through the centre (or larger) faces of the triple pinions.

The third or forward drum is used to reverse the movement of the machine. When the drum is held stationary the two sleeves within the sleeve on which it is mounted will revolve. The pinion of the outer sleeve meshes with the rear or smallest faces of the triple pinions, and when the flywheel is revolved the triple pinions, as they must turn in the same direction, necessarily cause the pinion keyed to the brake drum sleeve to turn in the opposite direction.

Driving the Main Shaft.

To drive the main driving shaft at the same speed as the engine the clutch is engaged by allowing the tension of the spring on the sleeve carrying the driving plate to force the collar contacting with the three fingers forward as far as it will slide on the sleeve. The fingers force the studs of the clutch push ring through the spider and the ring pressing on the plates brings them into contact. When this has been done the bands that constrict about the low and reverse drums are free and the entire assembly will revolve as a unit. But when the drive is direct the service brake may be used as desired without causing the pinions or sleeves to revolve.

With this construction the gears are always in mesh and the operation is extremely simple, although the explanation may appear lengthy. Pressure of a foot pedal will operate the service brake at any time, for no matter in which direction the brake drum is turning the band surrounding it can always be contracted.

Gearset Serves Several Purposes.

The Ford gearset is well designed and its use serves several purposes. First of all it is extremely simple in operation because all of the gears are always in mesh and there is no possibility of damage to them in changing the speeds of the vehicle. As the drums and pinions have ample bearings and these bearings are bushed, the

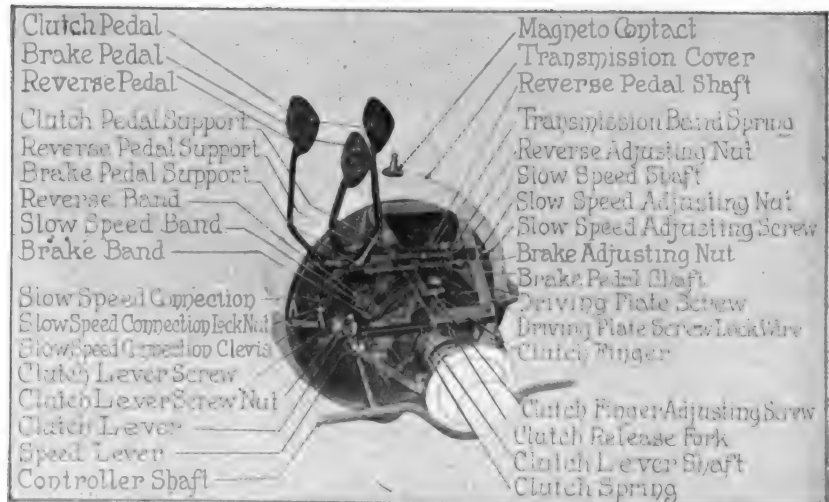
bushings may be renewed as wear is manifested. The assembly is supported at the forward end by the flywheel and at the rear end by the bearing in which the sleeve attached to the driving plate is mounted, and as the gearset is of considerable weight the flywheel may be correspondingly light.

The three drums that operate the brake, the low and the reversing gearing, are mounted so that these are always operative without reference to the other. The bands are thin strips of steel with a lug or ear at either end, and these lugs are carried on rods placed transversely in the gearset case with springs between the lugs. The lugs are forced together by cams that are actuated by foot pedals, and when the pressure is released from the pedals the springs will cause the lugs to separate and the pressure upon the drums will be released. Thus the driver cannot make a mistake. The brake on the gearset is operative only so long as the pedal is depressed, the low gear ratio and the reverse are similarly operated, and after the low gear ratio band is contracted and the vehicle is moving forward, by forcing the hand lever forward the clutch discs are contacted and the same cam action that retains the lever in its position releases the low ratio band. Because of this design the lever must be brought back to its centre or neutral position to release the disc clutch. With the lever in neutral and all of the pedals normal the engine may be driven idle and the vehicle cannot be moved.

The bands that contract on the series of three drums about the gearset assembly are lined with a fabric that has a high co-efficient of friction, and as the drums are comparatively large and the surface area of each proportionate, the efficient operation of the different ratios and the brake is assured. The gearset is entirely enclosed in the engine case and it is effectually protected from abrasives and deteriorating influences, while it is thoroughly lubricated because of the distribution of oil throughout the base of the motor. The lining of the bands is not affected by lubricant, and the bands may be renewed in comparatively short time and at trifling expense whenever necessary.

The drive of the planetary gearset is always positive and any desired gear ratio can be select-

ed as desired without reference to others. As a matter of fact the construction affords a series of individual clutches, so that there is no possibility of complication. The motor has sufficient power, so that normally it may be operated direct, and in average conditions there is no reason why the low ratio should be required for driving other than for starting and on steep grades. Obviously, additional ratios could not be obtained without greatly complicating the construction, but for the work for which the machines are built the gearset is highly satisfactory. When driven direct there is no more efficient design, and while the reduction to either low or reverse is very large and considerable power is lost in friction, efficiency is not sacrificed. In the operation of the vehicle the multiple disc clutch may be "slipped" whenever desirable, this lessening the



Phantom View of a Ford Gearset Case Illustrating the Operation of the Clutch, Reverse and Brake Pedals.

efficiency of the driving system or entirely releasing it for a brief period, as when slackening speed, turning corners, or passing over road surface obstructions. Similarly the low or reverse ratios can be partly engaged so as to obtain a desired effect by variance of pedal pressure, and in the event of emergency simultaneous operation of the low and reverse pedals will have a retarding effect upon the vehicle.

By this is meant that with pressure upon the low speed pedal the driving influence would be slowly ahead, and the pressure upon the reverse pedal would have an effect to reverse the movement of the main shaft. Obviously the shaft cannot turn in both directions, and if the pressure upon both pedals is approximately the same, neither the engine nor the road wheels can turn.

(To Be Continued.)

FORD-LAFRANCE MOTOR CHEMICAL CAR.

SMALL towns, cities and villages that heretofore have been barred from motorizing their fire departments by the prohibitive cost of motor fire apparatus, now have the opportunity of equipping their departments in the modern manner at small cost.

The accompanying illustration shows a double tank chemical fire fighting apparatus mounted on a Ford chassis. The manufacturer of the apparatus, the American-La France Fire Engine Company, Elmira, N. Y., selected this chassis because of its dependability, its light weight, strength, ease of operation and because its repair parts can be obtained anywhere at any time with a minimum of delay.

Chemical engines are an important part of the modern fire fighting equipment, and no large

trip will be a test for the tires and an effort will be made to reach the Coast on Toledo air. Other Cole eight owners who will shortly start for the Coast are W. P. Conley of Brooklyn and Alex B. Legre of Washington, D. C. Dr. Grant Houston of Decatur, Ill., is making a trip through the East in a Cole eight roadster and has covered more than 1000 miles.

ANALYSIS OF ADVERTISING.

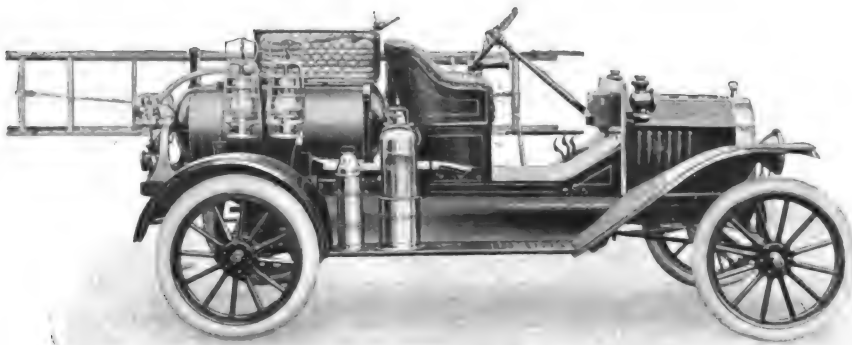
Because he heard a conversation in a Pullman which indicated that some people believe the vast advertising campaign of the Willys-Overland company must cost about \$200 per car, John N. Willys has been moved to make a frank statement regarding the matter.

"Last year our advertising cost per car was a little less than 2½ per cent.; this year it will be a trifle less than that; next year, materially less, owing to greatly increased production. The quantity of our production spreads all overhead, so that the item per car is so small that the buyer pays for little more than actual labor and material entering into it, plus a reasonable profit, which also is small, owing to the

great volume of business.

"Given two cars of equal structural and mechanical worth, the one built in large quantities can always sell for a lower price than the one built in limited quantities. The larger the production the greater the supply of materials purchased. And the larger the order for raw materials the lower the price to the manufacturer. The man who buys by the ton can always get a better price than the man who buys by the pound. This is one of the foundation stones of modern business and the basis of the great argument for advertising.

"Advertising makes it possible to sell many more cars, to get a greater volume of business, and so makes it possible to save in hundreds of items due to large scale production. Inasmuch as the results from advertising depend largely on the price, it reasonably follows that the price should be as low as a proper profit will permit.



Fire Fighting Chemical Apparatus Mounted on Standard Ford Chassis.

city's department is considered adequately equipped unless a proportionate portion of its apparatus includes chemical tanks. Insurance statisticians show that about 90 per cent. of all fires are put out in large cities by chemical streams, no water being used at all.

The chassis is the standard Ford, four-cylinder, 3¾ by four inches, 20 horsepower. The equipment includes two 25-gallon seamless drawn steel tanks; 100 feet of ¾-inch chemical hose, wire hose basket, three non-corrosive acid receptacles, soda bag and fire department extinguisher. In addition is the usual fire apparatus and motor car equipment.

COLES GO TO COAST EXPOSITIONS.

A Cole eight, fitted with McNaul tires, will leave Toledo shortly for a 2800-mile trip to Yellowstone park and the Pacific expositions. The

FORD CAR ACCESSORIES AND EQUIPMENT.

TWO NEW APCO SPECIALTIES.

Easily Installed Apco Door Anti-Rattler Retails at 20 Cents; New Muffler Cut-Out Is an Improvement.

The two Apco specialties for Ford cars which are illustrated herewith and manufactured by the Auto Parts Company, Providence, R. I., have just been placed upon the market. The Apco door anti-rattler is attached to the door with little work. All that is necessary is the removal of one of the wood screws on the body hinge assembly and the use of the same member to secure the anti-rattler. It is made of the best imported spring steel and attaches to the bottom hinge assembly on 1915 and 1914 models and to the top of the 1913 types. The device retails at 20 cents.



Apco Anti Door Rattler and Improved Muffler Cut-Out.

The Apco muffler cut-out is an improvement over the one formerly made by this company. It is equipped with a new pedal which is designed to be disassembled so as permit an easy installation. The part through which the pedal standard passes is secured to the floor by a lock nut and the pedal proper is attached by a pin. This assembly requires a much smaller hole in the floorboard than the former model.

DEMOUNTABLE CLINCHER WOOD WHEELS.

A Complete Set of Four Demountable Clincher Wood Wheels and Five Demountable Rims for \$16.

That the Ford owner may enjoy the conveniences offered by some of the higher priced cars, the Superior Lamp Manufacturing Company, 136 West 52nd street, New York City, is marketing a set of demountable clincher wood wheels, with demountable rims attached. The set consists of four wheels made from the best growth hickory, and five demountable rims, one for use as a spare. A wrench and necessary bolts are supplied and all holes are drilled ready for attachment. Unless otherwise specified, 30x3½ rims are furnished, although 30x3 may be obtained if desired. The wheels can be obtained in natural wood or black finish without an increase of price. The complete equipment retails at \$16. This set of wheels is adaptable to the Maxwell, Model 25, and if they are desired for use on that car the fact should be stated when ordering.



Superior Demountable Clincher Wood Wheels.

This company also manufactures a regular clincher wheel for Ford cars. This wheel is not of the demountable type and is designed for replacement purposes. The

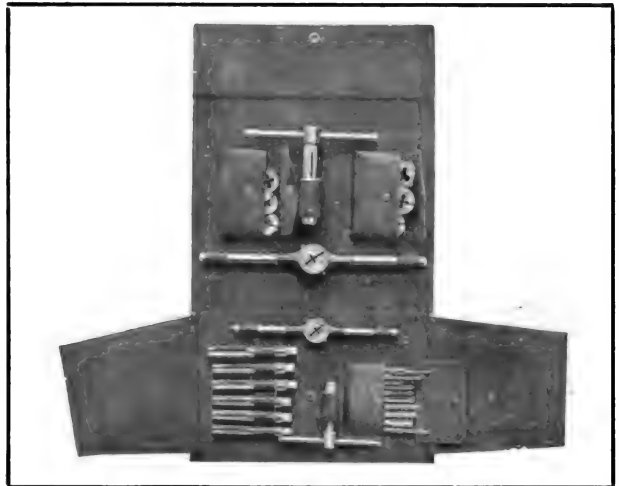
retail price of this wheel is \$3 each. Dealers are invited to investigate the company's proposition concerning selling plan and discounts allowed.

REPAIR KIT FOR FORD CARS.

This Tap and Die Set, Adapted to the Model T and Useful on Other Cars, Sells for \$18.50 at Retail.

For recutting threads on all parts of model T Ford cars the Greenfield Tap and Die Corporation, Greenfield, Mass., is marketing a complete set of 16 taps and 16 dies, two stocks and two tap wrenches in a single repair kit, which is listed as No. 2500 in the firm's catalogue. The different units are neatly arranged in a goat skin case, which is lined with canvas. If it is preferred they may be had also in a hard wood box. The leather case has some advantage in that it is more conveniently carried than the box.

An outfit of this type should prove useful to the private owner who does his own repairing, as well as to the garage and repairman. The fine threads on the Ford



Greenfield No. 2500 Repair Kit.

make close and accurate fits a necessity. In addition to meeting all the requirements of work on that car, this outfit can be used extensively on a great many other makes. The price complete is \$18.50. Further information will be supplied to those who write the manufacturer, mentioning this journal.

NEW PEDERSEN LUBRICATOR.

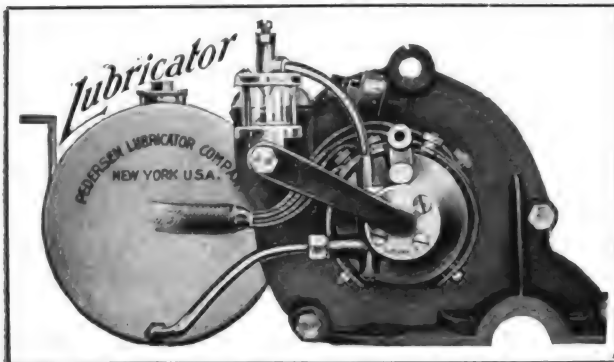
An Automatic Feed Pump for Ford Cars Which Insures Proper Lubrication of the Motor.

The accompanying illustration shows a new lubricator for Ford cars being manufactured by the Pedersen Lubricator Company, 644 First avenue, New York City. It includes a half-gallon oil tank, a small positive rotary pump, and an adjustable sight feed. The pump is mounted on the end of the timer shaft and the sight feed, which is connected with the pump, is fastened to the engine head by the timer spring bolt.

The pump draws the oil from the tank and forces it through the sight feed to the engine through the breather tube. An adjusting screw on the sight feed permits the regulation of flow of lubricant. The advantage of this device is that the oil level in the crank case can always be maintained, the lubricator being posi-

tive in its operation and entirely automatic, starting and stopping with the motor. Installation is very simple and can be made in about 10 minutes. The retail price of the

dealers. The Handy gasoline saver is designed to afford a ratio of air that will insure the highest degree of combustion.



New Pedersen Lubricator for Ford Cars.

Pedersen Junior lubricator is \$7.50.

The illustration also shows the united terminals made by this company as applied to the timer. All the wires are at the top to prevent them from becoming oil soaked and make them very accessible. This appliance sells for 50 cents. The manufacturer will gladly furnish further particulars to those who mention this magazine when writing.

REFLEX SPARK PLUGS.

High-Grade Spark Plugs Which Have Become Standard in 16 Leading Automobiles and Motorcycles.

The Reflex Ignition Company, 211 High avenue, Cleveland, O., is manufacturing several types of high-grade spark plugs, one of which, Reflex No. 1, is shown in the accompanying illustration.



Reflex Spark Plug No. 1.

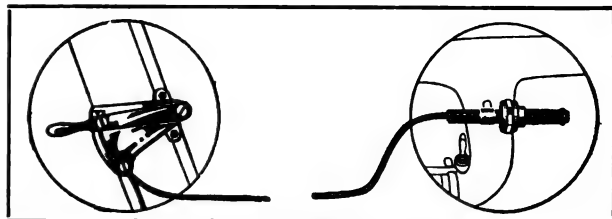
Enclosed end. Baffle.

It is simple in construction, yet very strong and is warranted to be compression tight. Like the remainder of the Reflex line of plugs, this type is equipped with the patented concave baffle on the central electrode, which deflects all dirt and soot away from the enclosed combustion chamber and out through the circle spark gap. The sparking gap, being circular in shape, affords a large range of adjustment for the central electrode. It is declared that carbon or soot cannot hinder the operation of the plug, and that the porcelain is absolutely heat proof. Reflex plugs are reliable in every detail and have been adopted by 16 of the leading automobile and motorcycle manufacturers. Every plug is sold under a guarantee to give satisfaction and after a 30-day trial they may be returned and purchase price will be refunded if found unserviceable. Interested persons may obtain catalogue and prices by writing to the company and mentioning this journal.

HANDY GASOLINE SAVER.

An Economiser Claimed to Increase Power Production and Save at Least 30 Per Cent. of Fuel.

The ability to save from 30 to 40 per cent. of fuel, to increase power with the reduced gasoline consumption, as well as to reduce carbon deposits, is claimed for the Handy gasoline saver illustrated on this page. It is the product of the Cray Company, 650 Woodward avenue, Detroit, Mich., and is sold throughout the country by



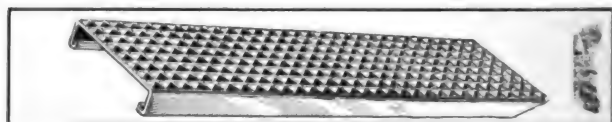
Handy Gasoline Saver.

The apparatus is automatic in operation and but little attention is required. It is controlled by a small hand lever conveniently mounted on the steering column, and the auxiliary air valve is attached to the intake manifold above the carburetor. The saver is sold with the condition that if the purchaser is not satisfied with its economy after a trial of 30 days the full price will be returned. The standard type is priced at \$7.50, while the Junior type is at \$5.

ALUMINUM RUNNING BOARD.

A Corrugated Slip-On Running Board Designed for Ford Cars That Will Not Rust.

The Ford Specialty Company, 635-37 North Broad street, Philadelphia, Penn., manufacturer of a large variety of specialties for the Ford car, is producing the



Hudson Aluminum Slip-On Running Board.

Hudson aluminum slip-on running board, illustrated.

Bolts or nuts are not required in its application, it being held secure from rattling or loosening by the flanges on the sides. Being of aluminum it will not rust and adds to the appearance of the machine. Its corrugated surface makes for positive foot hold under all conditions. The retail price is \$3.50 for a set of two.

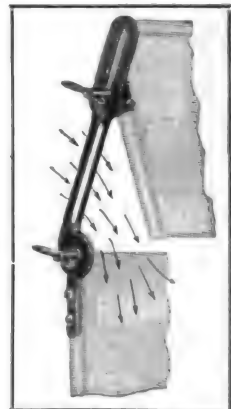
RAIN VISION VENTILATING DEVICE.

Clear Vision Under All Conditions Insured by Steel Hinges, Which Attach to the Windshield.

The demand for a clearer vision windshield for Ford cars is being met adequately by the Banker Wind Shield Company, Ellsworth and Negley avenues, Pittsburg, Penn., with its attachment that permits the setting of the shield at any angle. It also insures the ventilation of the front compartment.

The device consists of a special set of hinges, as illustrated, designed to replace the original set. The adjustments possible with the old hinges are also possible with the Banker hinges. A desirable feature, in addition to the clearer vision obtained, is that the occupants are at all times thoroughly protected on rainy days.

Installation can be quickly made by the owner, as complete instructions are furnished with each set. The hinges are made entirely of steel and are finished in black enamel. They retail at \$3.75 per set.



Banker Rain Vision Windshield Hinge.

AUTO MOTOR RUNS ON END.

A remarkable demonstration of the efficiency of the lubricating system employed in motors made by the Wisconsin Motor Manufacturing Company, is the use of one of these motors for 10 hours daily in driving a rotary water pump. It is mounted on end for this purpose, the cylinders being horizontal instead of vertical.

The engine is a stock model with a bore of $4\frac{3}{4}$ inches and a stroke of $5\frac{1}{2}$ inches, giving an S. A. E. rating of 36.1 horsepower, but will deliver much more power when operated to maximum capacity. It drives a direct connected centrifugal water pump, which delivers 750 gallons of water per minute. The illustration shows how the engine is set up and shows the water delivered from the pump outlet.

Ordinarily, the motor is lubricated by a pump, which takes its supply from the bottom of the crank case. But for operation in the upright position a special reservoir was provided under the engine and the lubricating pump attached to a line from the bottom of this reservoir.

Oil is pumped to the main bearings, which are flooded, the excess being forced through a hollow crankshaft to the connecting rod bearings. From the connecting rod bearings oil is distributed by centrifugal force to all the moving parts. On its return to the reservoir it is screened.

The motor is cranked from the upper end by a man standing on a platform. It is cooled by water from the tank on the wall above. As will be noted, the only change made is in the installation of the carburetor, which must of necessity coincide with the position of the motor.

MOTOR TRAFFIC PREDOMINATES.

A census of the traffic over the country roads of Milwaukee county, Wisconsin, shows that in 1914 more motor vehicles passed over the roads than did those propelled by muscular power.

On Aug. 30 last, from 7 a. m. to 10 p. m., 1373 motor vehicles passed a counting station where on two successive days, from 5 a. m. to 12 p. m., in 1911, only 39 had passed. Twenty-nine motor trucks were counted here in one day, as against only three in 1911.

Many other similar figures secured on various points about the roads in Milwaukee county have persuaded the county commissioners that concrete, as the best road surface for motor traffic,

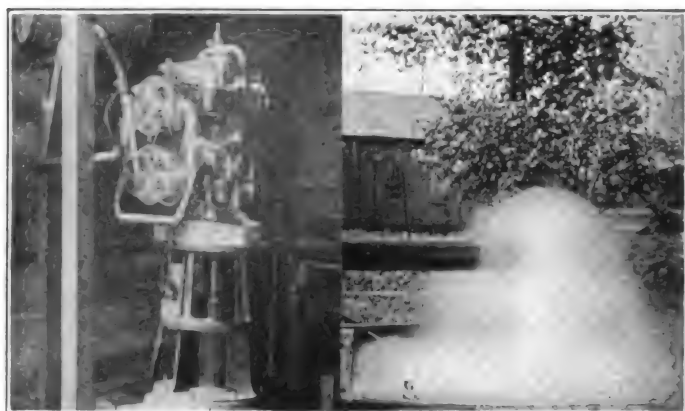
should be adopted in paving those roads. Commissioner Kuelling said in his annual report:

"While concrete in its present form has some disadvantages, we believe that it meets modern traffic conditions as economically as any form of pavement known."

Up to the end of last year about 50 miles of concrete road had been built in the county. Cost of construction, including materials, hauling, mixing, placing, depreciation on machinery, liability insurance, and all other costs, came to only \$1.24 to \$1.72 per yard of paved surface. Maintenance cost ranged from \$15 to \$30 per mile a year.

PACKARD WINS EXPOSITION AWARDS.

The highest honors for automobile builders granted by the authorities of the San Francisco exposition, have been given to the Packard Mo-



Model U-4—Wisconsin Motor Mounted on End to Drive a Centrifugal Water Pump, and the Water Outlet Delivering 750 Gallons a Minute.

tor Car Company. The Grand Prize for general excellence in the field of automobiles and automobile construction, considering output volume, length of time in business and the like, has been awarded to that company.

Fifteen gold medals were distributed for excellence in the transportation division. Other recipients were Pierce-Arrow, Cadillac, Ford and the British Rolls Royce in the passenger car field; the Federal motor truck, in the commercial field, and the Indian motorcycle. The Kissel Motor Car Company of Hartford, Wis., received a silver medal and the Briscoe Motor Car Company a bronze medal.

The competition of the British Rolls Royce, which sells for nearly three times the price of the new Packard Twin-Six, and is regarded as the best European car, increases the significance of the Packard award.

PRACTICAL FACTS FOR NEW CAR OWNERS.

The Importance of Properly Caring for Inner Tubes—Readers' Queries—Suggestions as to Repairs and Operation.

IN THE matter of inner tubes the tire manufacturers give general advice that will repay the new car owner in dollars and cents, as well as in comfort, to give proper heed. The manufacturer of Firestone tires, the Firestone Tire and Rubber Company, Akron, O., states:

"If tire users better understood the construction of inner tubes, and things which contribute to their wearing out, it would be easy indeed to secure more and better service.

"Spare tubes should not be carried in cardboard boxes as furnished from dealers' shelves—there is danger of the tubes being chafed. If the car is equipped with smaller tires on the front wheels than on the rear, an extra tube should be secured for each size. The cross sections of inner tubes are made a little smaller than the normal air space inside of the case. It is not, therefore, advisable to use a $4\frac{1}{2}$ -inch tube in a four-inch case. This usually wrinkles and creases the rubber, with bad results. Do not use a four-inch tube in a $4\frac{1}{2}$ -inch case for any length of time; when this is done the rubber is required to stretch too much and the effect of heat and action due to displacement of air in the tire quickly uses up the nerve and life of the tube."

This opinion is general among tire makers. The Goodyear Tire and Rubber Company, Akron, declares:

"One should remember that the worth of a tire depends largely on the inner tube. An inner tube simply provides an air-tight container for air, the casing providing the necessary strength. When inflated the tube simply flattens out against the interior of the casing and against the rim. And so the inside of the casing and the

rim should be kept clean, for any foreign substance will cut the tube."

The illustrations on this page are presented through the courtesy of the Goodyear company, and accurately show the results of abuse of inner tubes that are common in the realm of motoring.

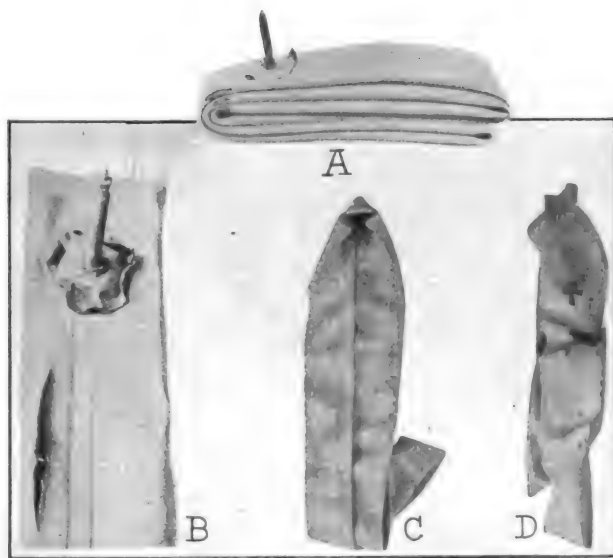
At A is illustrated an inner tube that was ruined by its being carried without protection. Spare tubes are frequently carried in the tool box, folded, and there come in contact with grease, oils and sharp edged tools. While searching for tools the tube will push around, which results in

chafing and wear of the folded edges. The injury can be seen at the fold near the valve.

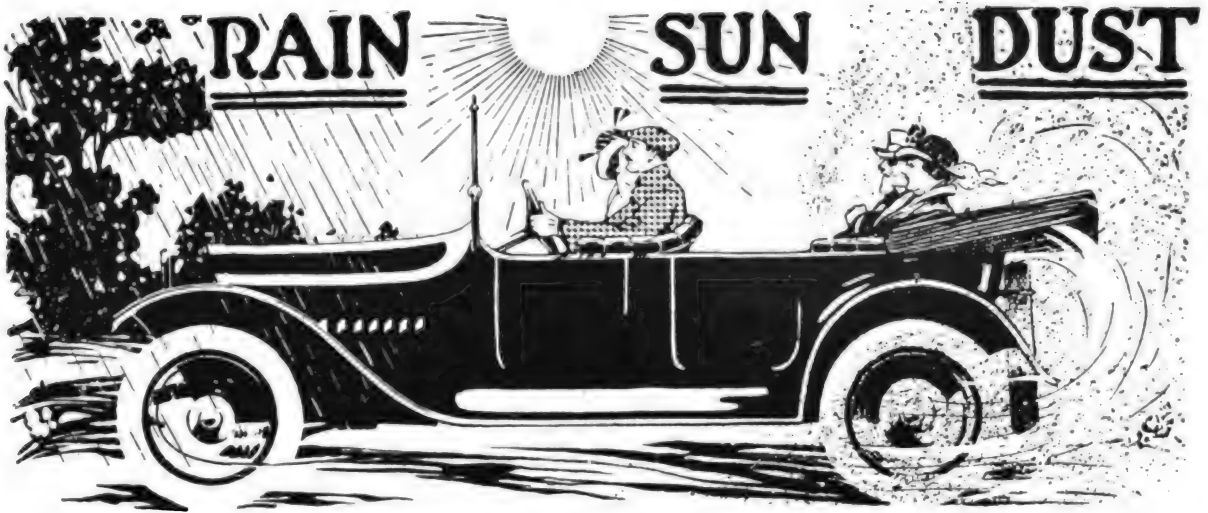
The split shown at B is the result of carelessness in replacing the tube in the casing, it being allowed to become pinched. This will explain the mystery that some motorists have experienced when their tube has suddenly blown out on the road without apparent cause. Invariably the casing is intact, which adds to the mystery. When inserting tubes be absolutely certain that no part of

it is pinched between the casing and the rim. Users of regular clincher tires should pay particular heed to this warning.

The natural flexing of the tire requires an effective lubricant between the tube and casing, otherwise the tube will become heated and sometimes even will become vulcanized to the casing. In such cases, an attempt to remove it will result in such a tear as is shown at C. Lubrication of the tube requires the car owner to exercise judgment. Insufficient lubrication is ruinous, and on the other hand too liberal an application will cause the talc to cake on the surface of the tube and the edges cut into the rubber.



Four Inner Tube Injuries That Are Due to Carelessness and Abuse.



Weather Does Not Injure Cars Protected With **JOHNSON'S PREPARED WAX**

"The Weatherproof Body Polish"

Take your car through rain, sun and dust, and bring it out as brilliant and lustrous as when you put the finishing touches on it in the garage. And the reason is that **Johnson's Prepared Wax**

"Sheds Water Like a Duck's Back"

It imparts a hard, dry gloss over the entire body of your car, building up a shining veneer that will not crack or check.

Several coats of **Johnson's Prepared Wax** will revive that appearance of newness, though the varnish on your car may have become rough from wear.

In many cases the timely use of **Johnson's Prepared Wax** saves the expense of having cars revarnished.

Imparts a Hard, Dry Finish, Unaffected by the Hottest Sun

Your car, properly treated with **Johnson's Prepared Wax**, will virtually go through fire and water—and come out unscarred. The hardest rain will not dim its mirror-like polish. The hottest sun has absolutely no effect on its smooth, glossy coat.

Does Not Collect Dust

Johnson's Prepared Wax imparts a perfectly hard, dry, glasslike polish to which the dust cannot adhere. It is quite different from the many oily polishes on the market which gather and hold every speck of dust.

Johnson's Prepared Wax is clean and easy to apply and inexpensive. Increases the value of your car on the market, and gives you the prestige that comes with the appearance of prosperity and class.

One Pint by Parcel Post 60 cents—
enough for a season's use.

Send 10c for Sample Can of
Johnson's Prepared Wax, sufficient
for one application on
a large car.
Agents Wanted

S. C. Johnson & Son

"The Wood Finishing Authorities,"

Racine, Wis.



S. C. JOHNSON & SON.
Racine, Wisconsin

AJ

I enclose 10c for a can of **Johnson's Prepared Wax**—sufficient for one polish on a large car.

Name.....

Address.....


City & State.....

My Accessory Dealer is.....

(When Writing to Advertisers Please Mention The Automobile Journal.)

Meet me at the
Tuller

For Value,
Service, Home
Comforts



New HOTEL TULLER
Detroit, Michigan

Center of business on Grand Circus Park. Take Woodward car
get off at Adams Avenue.

ABSOLUTELY FIREPROOF

200 Rooms, Private Bath, \$1.50	Single, \$2.50	Up, Double
200 " " " 2.00	" 3.00	" "
100 " " " 2.50	" 4.00	" "
100 " " " 3.00 to 5.00	" 4.50	" "

Total 600 Outside Rooms. All Absolutely Quiet.
Two Floors—Agents' New Unique Cafes and
Sample Rooms Cabaret Excellence

The Hotel Van Rensselaer

15 to 19 East Eleventh Street
NEW YORK

Close to Washington Square.

In the heart of the fashionable residential
district—just east of Fifth Avenue and
one minute from Broadway.

Terms—Single Room, with detached
bath, \$1.00 per day.

Double Room, with detached bath, \$1.50
per day.

Single Room, with private bath, \$1.50
per day and upward.

Double Room, with private bath, \$2.00
per day and upward.

American plan—room and meals, \$2.50,
\$3.00, \$3.50 per day.

Suites—parlor, bedroom and private bath,
including all meals for one, per week,
\$22.00 up; for two, per week, \$28.00 up.

Especially low rates by the week
during the summer months
Write for Circular

JOHN HARRIS - - Manager

Just the
Place for
Your
Mother
and Sisters
Where
They Will
Receive
the Best
of
Attention
and
Protection

(When Writing to Advertisers Please Mention The Automobile Journal.)

20,000

Owners of Pleasure
Cars read each issue of

THE AUTOMOBILE JOURNAL

The Journal circulates in a distinct field and
in the greatest Motor Vehicle and Accessory
market in the world.

Where business can be developed and main-
tained.

Some interesting facts at request.

Automobile Journal Publishing Company
Times Building **Pawtucket, R. I.**

Peerless Quality in Smaller Size

"ALL PURPOSE" FOUR AND SIX
FOUR AT \$2,000 (Sixes \$250 Extra)

THE PEERLESS MOTOR CAR CO., CLEVELAND, OHIO

Makers also of the "48-Six" and Peerless Trucks.

Licensed under The Kardo Patents.

F. SHIRLEY BOYD

175 Massachusetts Ave., Boston, Mass.

R. I. V. Ball Bearings.

Baldwin Chains and Sprockets.

J. H. Sager Line.

Tarvia

**PREVENTS DUST
PRESERVES ROADS**

Booklets on request

BARRETT MANUFACTURING CO.

New York, Chicago, Philadelphia, Boston, St. Louis, Cleve-
land, Cincinnati, Pittsburg, Detroit, Birmingham, Kansas
City, Minneapolis, Salt Lake City, Seattle.



AUTOMOBILE ELECTRIC LIGHTING SPECIALTIES

For the Automobile Owner and Manufacturer
who wants SERVICE for his money

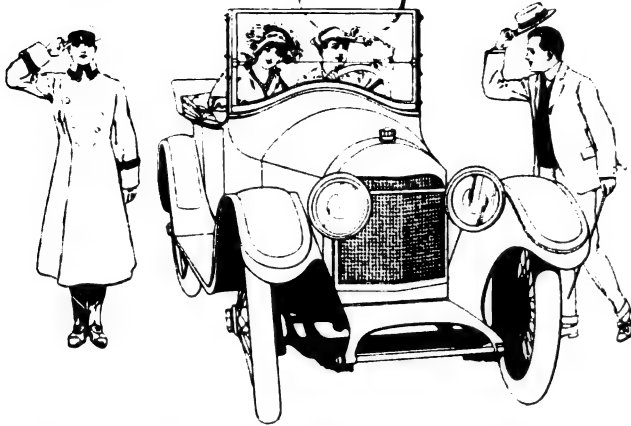
ELECTRIC LIGHTING SPECIALTIES Made to Order

CULVER-STEARN'S MFG. CO.

Worcester, Mass.

Detroit, Mich.

Recognition



ONLY those used to quality can recognize quality—only those accustomed to the best can recognize the best. Good judgment in the recognition of values comes only from training.

The wise man bases his judgment on that of experts, building his advance on their experience.

The wise motor car buyer wisely follows the motor car buying of those who know, and recognition of their judgment gives him basis for his decision.

SCRIPPS-BOOTH COMPANY, DETROIT, MICHIGAN

Scripps-Booth

Scripps-Booth cars are a frequent sight at exclusive homes on Fifth Avenue or Sheridan Road, in line at prominent receptions or parked near the better clubs.

Recognition of Scripps-Booth quality by this class of buyer is the most convincing of arguments.

The Scripps-Booth is the logical light car for the big car owner. An investigation is worth your time.

Probably the most common abuse of tires is running flat. This not only hurts the casing, but quickly ruins the inner tube. As the sides of the casing are crushed between the rim and the ground, the tube is ground and pinched. The tube shown at D was ruined by running flat.

READERS' QUERIES.

Suggestions to Owners—Timing a Rapid Truck, Overheated Truck Engine, Adjusting Valves of a Reo Truck and Various Mechanical Suggestions.

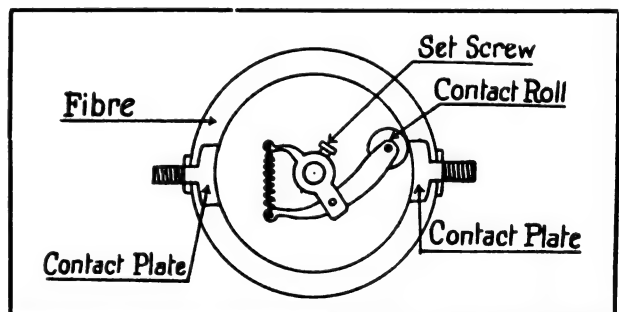
Timed Wrong—R. McG., Jackson, Miss.

I drive a one-ton, two-cylinder Rapid truck, which has a dry cell ignition system. I have always been successful in doing my own repairs, but I now have a trouble I cannot locate. The motor has no power and starting is extremely difficult. The battery is new, the wires in good order and the terminals fast. The carburetor is clean and there is no dirt in the pipe. The adjustment has not been touched, as it has always afforded efficient operation. The compression is good on every cylinder. The plugs seem to fire strongly when grounded on the cylinder, but yet the power is missing.

The loss of power and difficult starting is probably due to late firing. When the motor is timed late the spark, although strong, occurs in


(When Writing to Advertisers Please Mention The Automobile Journal.)

the cylinder after the piston has started on its downward stroke. This condition decreases the compression pressure and causes a slow burning mixture, which not only causes rapid formation of carbon, but also causes "popping back" in the carburetor. This is the result of the mixture not being fully consumed before the intake valve opens. If the writer remembers correctly, the



Means for Adjusting the Timer of a Two-Cylinder Motor to Correct Late Firing.

contact arm is attached to the camshaft by a small set screw, as shown in the accompanying illustration. Late timing can, therefore, be the result of one of two things, the roll or arm has moved from its position on the camshaft or the commutator shell or case retards too much. It is probably that the former is the cause. It is ad-



HARRIS
TRADE MARK REG. U.S. PAT. OFF.
OILS
AND
GREASES

90% of motor ills are traceable to faulty lubrication. Often an inferior lubricant is directly responsible—a lubricant with an asphaltum base.

HARRIS OILS and GREASES, made of finest Pennsylvania Crude have a *paraffin* base. Paraffin is a *lubricant*—asphaltum is not. Asphaltum means carbon deposit. There is not a trace of it in HARRIS products.

The wiser, more progressive dealers are handling HARRIS OILS and GREASES. Their customers who have tried these pure oils accept no others. Remember,

"A Little Goes A Long Way and Every Drop Counts."

Sold in Bbls., Half Bbls., 10 Gal., 5 Gal., and 1 Gal. Cans—also in special iron drums in three sizes, 50 Gallon, 30 Gallon and 15 Gallon quantities. These are equipped with convenient faucets.

A. W. HARRIS OIL CO.,
326 S. Water St. Providence, R. I.
Branch: 143 No. Wabash Ave., Chicago, Ill.

Write for full particulars




**Why Freeze Yourself?
Ruin Your Auto?**

**The Superior
Safe Garage Heater**

SAFE. NO FUMES.
NO GASES

Equipped with pilot light. No matches, no danger, no discomfort. An ideal positive heater.

SUPERIOR MANUFACTURING CO. N. S. Pittsburgh, Pa.



BALL BEARINGS REGROUND
at one-fifth the cost of new, also New Single Row Annular, Thrust, New Departure Double Row and Radax Bearings

AHLBERG BEARING CO.
Boston Chicago Detroit New York
Los Angeles Cleveland St. Louis, Mo.

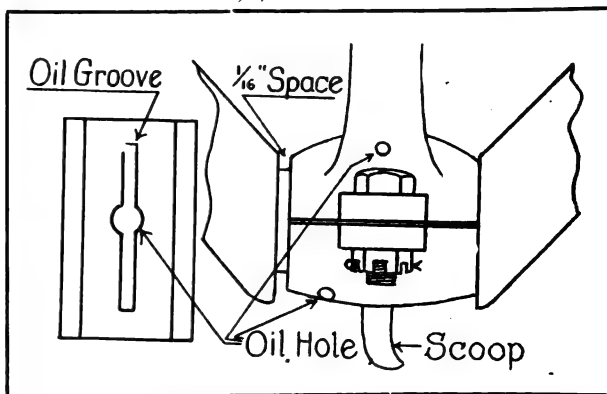
VALVOLINE OIL CO.
Heavy, Medium and Light
Automobile Oils
27 STATE STREET BOSTON, MASS.

(When Writing to Advertisers Please Mention The Automobile Journal.)

visible that you remove one of the spark plugs and ground it on the cylinder. Now place a piece of wire through the plug hole until it touches the piston. Determine the compression stroke and when the piston reaches dead centre, which can be ascertained by the wire, the relation of the contact point and the roll should be noted. With the spark lever retarded this is the point that the spark should take place and if it is not made the set screw in the roll should be loosened and moved on the shaft until it just touches the contact point in the shell. Do not forget to securely tighten the screw.

Engine Overheats—C. N. T., Boston, Mass.

During the past two months I have fitted two connecting rods to the front piston on my three-ton truck and now it is necessary to fit a third rod. I have increased the oil level, but it does not seem to help, and causes the car to smoke. The cooling system is in perfect order, but yet the motor quickly overheats. I am a machinist by trade and believe myself capable of fitting a connecting rod to a crankshaft, but the cause of this trouble is beyond my ability to solve. The oiling system is splash and the water circulation forced by a pump. A



The Grooves and Oil Holes for Truck Engine Connecting Rod Bearings to Insure Efficient Lubrication.

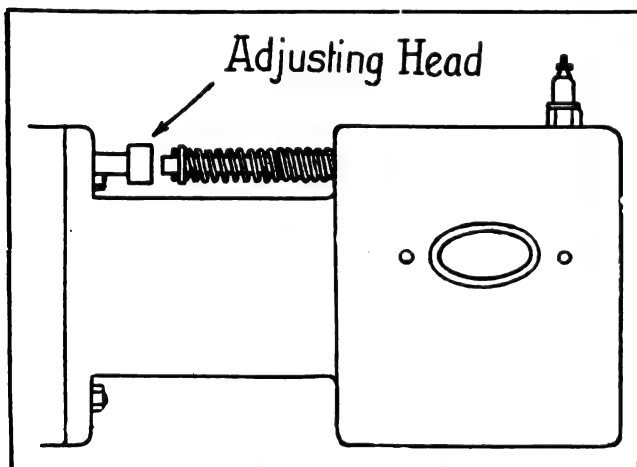
suggestion may be of much benefit to me.

Overheating may be the result of several conditions, such as an impeded circulation, loose fan belt, bent fan blades, carbon in the cylinders, poor carburetion, lathe timing, sticking valves, etc. One cannot state positively from the information given just what may cause the front connecting rod bearing to fail. You do not state whether it burns or breaks. If it breaks the cause is either poor material or it is out of alignment. As you no doubt know babbitt metal should be heated for pouring to the point where it will ignite a piece of paper. If the bearing burns it must be due to insufficient oiling. To secure adequate lubrication it is imperative that a space of about 1/16 inch should be allowed for side play between the rod bearing and the ends of the crank pin. This play is also necessary for alignment purposes, especially if the truck has been considerably used. Two

small holes should be drilled through the bearing, one in the upper half and the other through the lower part. An oil groove should then be cut horizontally to about $\frac{1}{4}$ inch from the ends, taking care of course that the groove registers with the oil hole. The writer is of the opinion that either you have forgotten to fit the oil scoops to the bottom of the rod, or they are not long enough to dip into the oil reservoir. This condition quickly causes overheating and if not promptly corrected may cause damage to the motor.

Adjusting Valves—C. L. G., Willow, Cal.

In one of your back issues I read how to adjust valves and push rods, but I find that my one-cylinder Reo truck has no adjusting nut on the plunger. When the valve is closed there is about $\frac{1}{8}$ -inch play, but I do not know how to take it up. I am told that the company has discontinued to make these trucks and there is no repairman in this vicinity that knows a great deal about them. Will you advise me how to reduce the play between the plunger and the valve stem and where I can obtain further information in the future?



The Shimmed Nipple for Making the Adjustment of the Push Rod of the Reo One-Cylinder Truck Motor.

The Reo one-cylinder truck is the product of the Reo Motor Car Company, Lansing, Mich. Although the company has discontinued to manufacture them, any information will gladly be furnished. It is true that this type of car is not fitted with any adjusting nut, but close inspection will show that there is or should be a nipple over the end of the push rod at the point of engagement with the valve stem. Inside this nipple are several fine round shims, and as you state the play is $\frac{1}{8}$ of an inch, you should remove the nipple and insert a number of shims until only a space about the thickness of an ordinary name card remains. Of course this nipple can only be removed and replaced when the valve stem is forced back and this can best be done with a thin screw driver. The push rods in the crank case are held by adjustable brackets, and when timing is difficult adjustment is made at the nipple. I would, there-

(When Writing to Advertisers Please Mention The Automobile Journal.)

DIXIE 20TH CENTURY MAGNETO

Wonderful simplicity of construction and accessibility of parts are striking features of this high-tension magneto, which penetrates its charge with a full spark at the lowest as well as the highest motor speeds.



SPLITDORF
Electrical Co.
NEWARK, N. J.

(All SPLITDORF features are fully covered by patent or patents pending)

★Hartford

SHOCK ABSORBER

SOOTHES THE ANGRY SPRING

Hartford Suspension Co.

Jersey City, N. J.

Mea
MAGNETOS



S. R. O.
BALL BEARINGS



Sole Importers

MARBURG BROS., 1790 Broadway, NEW YORK



Patented
PISTON RINGS

McQUAY-NORRIS MFG. CO.

In Use on Over
300,000
Automobiles

"ASK THE USER"

Dep't D, ST. LOUIS, MO.

There's no leak proof ring but the **LEAK PROOF** Ring — insist

HOTEL MAJESTIC

Central Park West at 72nd St.,
New York

Copeland Townsend, formerly Manager of the Hotel Imperial, New York, is now proprietor of the Majestic.

Overlooking Central Park and away from the noise and heat of lower Broadway, the Majestic offers to motorists a haven of quiet and rest after a tedious journey. During the summer season small suites consisting of sitting room, bedroom and bath may be secured at very low prices.

The Cafe Moderne and the roof garden, offer dancing nightly.

NOTICE FOR OWNERS AND CHAUFFEURS:

Coming into New York via Broadway, or down Fifth Ave., you will find this hotel conveniently located at the 72nd St. entrance to Central Park. A splendid garage just around the corner.

COPELAND TOWNSEND
Managing Director

DIXON'S
GRAPHITE GREASE NO. 677
For Transmissions and Differentials

Booklet No. 210-G.

Made in Jersey City, N. J., by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827

G. 42

"Don't Gamble With Safety"

Demand the Improved, Guaranteed

S-M-C Asbestos Brake Lining

Sold by all dealers or direct by manufacturer
STAYBESOS MFG. CO. Germantown, Philadelphia, Pa.

MOTOR PARTS COMPANY

OFFICIAL

BOSCH DISTRIBUTOR

Zenith Carburetor Mohawk Tires Leak-Proof Rings

185-187 Columbus Avenue, BOSTON
818 No. Broad St., PHILADELPHIA SPRINGFIELD, MASS.

REXO II \$3⁸⁵

The GARFORD MANUFACTURING COMPANY, 2506 Olive St., ELYRIA, O.
Successors to THE DEAN ELECTRIC COMPANY

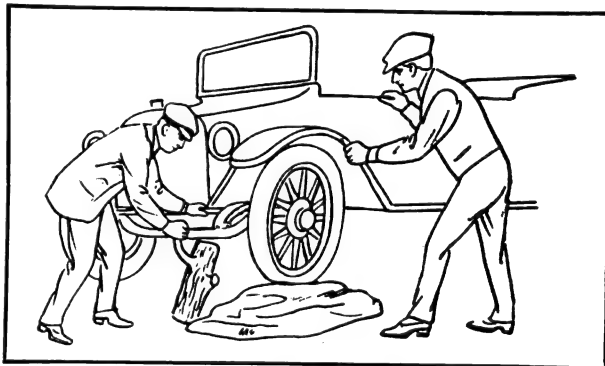
fore, suggest that the timing disagrees with the markings on the flywheel before inserting any shims.

A POSITIVE TAR REMOVER.

To remove tar from the body of the car, make a mixture of butter, or lard, and a small portion of salt, and apply with the fingers, rubbing gently so as not to scratch the finish. This will loosen the tar, if it has not become too hard through long standing, and it can be washed off with clean water.

IMPROVED JACK.

It frequently happens that when the motorist has need of a jack while in the country he finds that he has left his at home. In such contingencies the car may usually be raised in the following manner, and from articles generally found along the road. Obtain a large stone, such



Method of Raising the Car Without the Use of a Jack.

as is common on stone walls, and place it in front of the wheel to be raised. Next obtain a small stump of wood of sufficient height to place under the axle when the wheel is pushed on the stone and which will support the weight of the car without the wheel touching the ground. If the block is carefully placed a little ahead of the stone the car can be pushed forward so that the axle will rest on the block as illustrated.

WATERPROOFING TERMINALS.

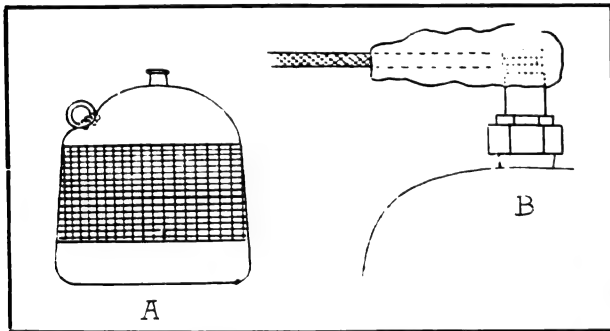
There are several motors, especially those of the earlier types, on which the terminals become wet and grounded on rainy days. A practical way to prevent this is one used extensively by experienced motorcyclists. Obtain a quantity of rubber dough, such as is used to fill cuts in tires, and wrap it around the terminal. When exposed to air the dough hardens and affords a perfectly

(When Writing to Advertisers Please Mention The Automobile Journal.)

water proof covering. A water proof spark plug terminal is shown in the illustration.

REMOVING DENTS FROM RADIATORS.

Motorists who have attempted to remove dents from radiator surfaces will no doubt agree that the operation is no easy task. Several methods are generally used, such as air pressure, filling with water, etc., the success of each depending mostly on the existing conditions. If the dent is very deep the following method can be used to restore the metal to very near its original shape. Hold an ordinary steel or brass ring up-right in the dent, as shown in the illustration, while some hot solder is poured around it. As the solder cools the ring will remain firm, after which the dent may be raised by pulling on the ring. After the part has been sufficiently straightened the ring may be removed by heating the solder. Of course the success of this



A, Removing Radiator Dent by Soldered Ring; B, Water Proofing Terminal with Rubber Dough.

operation depends upon the ability of the operator. Wire or a tin saddle may be passed through the hook if necessary and soldered to the radiator, thus affording a more powerful pull.

POLARITY DETECTOR.

Several methods may be used to determine the polarity of electric wires, but a very simple, yet accurate detector, is made by immersing a piece of white filter paper in a solution of sodium sulphate, to which has been added a small quantity of phenol phthalein. If the paper is touched while wet with the negative wire, a violet color appears, but when touched with the positive wire there is no change in color. Filter paper treated in this manner is sensitive to very feeble currents. Blue print paper can also be used for the same purpose. If touched with the negative wire, a white spot will develop, but the positive wire has no effect upon the color.

(When Writing to Advertisers Please Mention The Automobile Journal.)

Bosch MAGNETO IGNITION

1st—in Sioux City 300 Mile Race
1st—in Omaha 300 Mile Race
1st—in Tacoma 250 Mile Race
1st—in Tacoma 200 Mile Race
1st—in Tacoma 100 Mile Race
1st—in Vanderbilt Cup Race
1st—in Grand Prize Race
1st—in Indianapolis Sweepstakes
1st—in Chicago 500-Mile Race

No other ignition system can show you such a remarkable record—no other system is as reliable, as efficient or as fast—if any system were, it would be tried out and used. There's a reason for Bosch popularity.

For Reliable Ignition
Be Satisfied Specify Bosch

Bosch Magneto Co.

204 West 46th St., New York
Over 300 Service Stations back up Bosch Users.



Get a Can Today Vulcanizing Cement


Chauffeurs and car owners who do their own vulcanizing will appreciate the extra quality and convenience of Goodyear C-15 Vulcanizing Cement.

It's a pure gum cement—hence only a small quantity need be used to obtain satisfactory results.

This Goodyear C-15 Vulcanizing Cement is but one of the 22 Goodyear Tire Savers. You should send for the complete list if you seek extra mileage from your tubes and casings.

Goodyear Accessories are a quick remedy for all your tire troubles. But if you apply them soon enough—before the damage is done—you will avoid many tormenting tire layups when on the road. Goodyear Accessories are of the same top-place standard of quality as Goodyear Automobile Tires. Learn more about these Goodyear Tire Savers. A postal will bring complete book with instructions for applying. Address Desk 46.

THE GOODYEAR TIRE & RUBBER CO., AKRON, O.
Makers of Goodyear Fortified Automobile Tires. (2476)





CATARRH---ASTHMA---HAY FEVER

Bronchitis, etc., are the direct result of germ life—taken into the system through respiration. Immunity from these diseases is simply a matter of protection from germ laden dust. "O-ZEL-O" not only affords absolute protection from dust germs, but positively destroys all germ life which may be present. You breathe its healing, antiseptic vapor for hours at a time—while you work, sleep or play. Price, complete outfit \$2. Let us tell you about it.

THE O-ZEL-O CO., Dept. A54,
Fort Wayne, Indiana.

Are You Losing 2 H. P. Out of 20 In Your Transmission?

Transmissions are a source of great frictional loss—the amount depends upon the lubricant you use. Stiff, unyielding Grease puts a tremendous overload on the driving shaft. Oils leak off, leaving the gears unlubricated and unprotected. Hence, friction and loss of power results, and the gears soon wear out.



The ONE Perfect Lubricant For Saving Power Losses

NON-FLUID OIL is a soft-yielding, adhesive lubricant. It gives no resistance to the motion of the gears, but completely envelops and clings to the teeth at maximum speed. It does not melt or congeal. It stays in the housing. It is durable. It prevents metal-to-metal contact. Gears run quietly, shift easily, and don't absorb power. NON-FLUID OIL will increase your power, eliminate wear and reduce your lubrication expense.

**Get a Can Today and
Prove It.**

"K. No. 00 Special" for sliding gear transmission.

"K. No. 000" for differential compression cups and all bearings.

**Reduced Prices for 1915.
Ask Your Dealer.**

Avoid Substitutes

**New York & New Jersey Lubricant
Company**

165 Broadway, New York
1430 Michigan Ave., Chicago, Ill.



SAMPSON

Feather-Edge
INNERTUBE PLUG

No cement—no vulcanizing—no patches
Guaranteed

STEVENS & CO. 375 Broadway, N. Y.



SPEEDOLENE solves the problem of automobile and motor truck gear lubrication. One trial is all we ask. "A fair field and no favor" will demonstrate to your satisfaction that **SPEEDOLENE** is the King of all lubricants for GOATS.

Henry H. Kroh, Boston Distributor,
MANUFACTURED BY

Continental Asbestos Corporation, Worcester, Mass.

**22,500
GUARANTEED**

When you have anything to say to those in the automobile industry use straight trade talk copy in the

Accessory and Garage Journal

The only strictly automobile trade paper published in America

Automobile Journal Publishing Co.
Publishers

AUTOMOBILE JOURNAL **MOTOR TRUCK**
Times Building, Pawtucket, R. I.

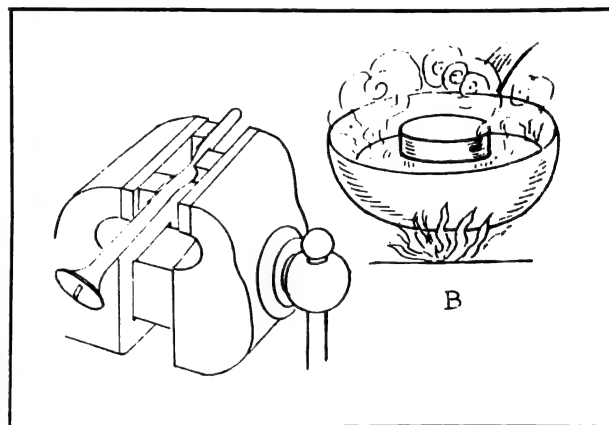
(When Writing to Advertisers Please Mention The Automobile Journal.)

STRAIGHTENING VALVE STEMS.

It is always advisable to replace a valve having a bent stem with a new valve. If, however, one cannot be readily obtained, the old one can often be straightened in the following manner: With a blow torch, or other small flame, heat the stem at the point of bend. Three V blocks should then be arranged in a vise, as illustrated, two at the ends and the other at the point to be straightened. This is a better method than hammering or bending cold, as the surface will not be marked and the valve will hold its shape when released.

EXPELLING GASOLINE FROM FLOAT.

There are several methods that are extensively used for expelling gasoline from a punctured metal float, one of the best of which is shown in



A, Straightening Valve Stem in Vise; B, Method of Expelling Gasoline from Leaky Metal Float.

the illustration. Nearly immerse the leaky float in hot water, taking care that the puncture remains above the water. The heat will quickly volatilize the gasoline and it will be expelled from the interior of the float in a steady flow of bubbles and gas. The float should then be allowed to cool, after which the puncture may be soldered.

TESTING OIL FOR ACID.

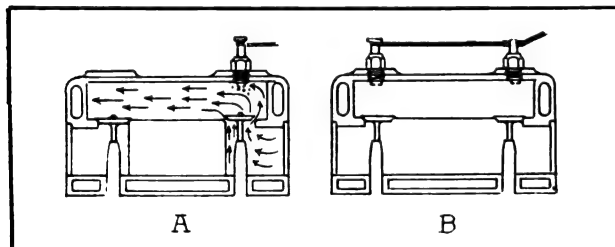
Improperly refined lubricating oils contain an acid that is injurious to metal. To ascertain the presence of acids the following simple test is suggested: Mix equal weights of sodium carbonate and water and permit to stand. If the lubricant contains acid a precipitate will settle to the bottom.

Another method is to soak a piece of cloth, or a lamp wick, in the suspected oil and wrap it

around a piece of brightly polished steel. Place it in the sun, protected from rain, and allow to stand for several days. If there is acid present a slight etching effect will be found on the steel; otherwise the steel will be clear.

INSTALLING TWO-PLUG IGNITION.

Experiments have conclusively proven that the two-plug ignition is a vast improvement over the single plug for certain types of motors. The power developed will be increased to a marked degree, especially on T head motors, in which the valves are located on opposite sides. It will be noted by referring to the illustration that the plug is usually located over the intake valve, and as the mixture passes it, any heavy substances will adhere to its surface, this being one of the causes of sooting. With the two-plug ignition type, as shown, one plug will generally fire at all times and burn the accumulation from the sooted member. To install the plug over the exhaust valve, it is only necessary to remove the valve cap



A, Tendency of Impure Mixture to Soot Spark Plug; B, Two-Plug Ignition Tends to Perfect Ignition.

in the cylinder and drill and tap a hole the same dimension as the plug. Of course, two ordinary plugs can be wired for simultaneous firing, but it is better to obtain a plug that has both electrodes insulated, so that it can be wired in series to the ordinary plug.

LUBRICATING SPRING LEAVES.

It is good policy to occasionally examine the chassis to determine that all bolts, rivets, spring clips, fender irons, etc., are tight. If the spring leaves have not been lubricated within a period of six months, it will be well to do so during the examination. There are several practical methods for this work. If no special tools are at hand the operation may be conducted as shown in the accompanying illustration. The weight of the body must be released from the springs. This necessitates the placing of the jack under the frame and raising until the wheels bear lightly on the floor. The leaves can then be pried apart

(When Writing to Advertisers Please Mention The Automobile Journal.)

**YOUR CAR
ANY CAR**

No matter how hot the weather, no matter what the speed or running conditions

Polarine

The Standard Oil for All Motors
Keeps cars running right.

Polarine is the temperature-tested, friction-proof motor lubricant. Motor construction is now so standardized that Polarine will lubricate any engine, correctly, economically—all the time. Sold everywhere. Look for the SOCONY sign on garages. It is the sign of quality.

STANDARD OIL CO. OF NEW YORK

Principal Stations:
New York
Buffalo
Albany
Boston

HEINZE



**High Tension
MAGNETO**

HEICO

Better Material
Better Work-
manship

HEICO

Better Manu-
facturing
facilities

FACTORIES
Lowell,
Mass.

SALES OFFICES
Detroit
Mich.

BRANCH OFFICES
New York
Detroit

BRANCH OFFICES
Chicago
Minneapolis

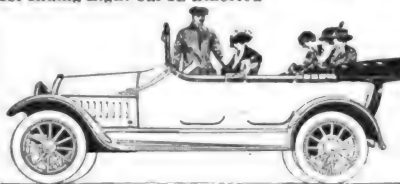
HEINZE ELECTRIC COMPANY

Make Heinze the Better Magneto

1916 Inter-State \$850

**"The Thousand Dollar Car" at \$150 less.
SAME CAR - NEW PRICE**

Powerful, Valve-in-Head Motor. Big, Full Five Passenger Body. Genuine Leather and Curled Hair. Floating Axle. Underslung Rear Springs. Over-size Tires. Two Unit Starting, Lighting and Ignition. "The Easiest Riding Light Car In America"



Energetic Dealers in open territory who wish to meet the keenest competition at a good margin of profit, will write or wire for our New Selling Agreement to-day.

Interstate Motor Co.
Muncie, Indiana

Thermoid

HYDRAULIC COMPRESSED Brake Lining - 100%

THERMOID RUBBER CO., TRENTON, N. J.

The Easiest Riding Car in the World

MARMON

F. E. WING
562 Commonwealth Ave.
BOSTON, MASS.
New England Dealer for
NORDYKE & MARMON CO., Indianapolis, Ind.

MARMON "41"
\$3250
132" Wheelbase

MARMON "48"
\$5000
146" Wheelbase

American Made for American Trade

New Departure Ball Bearings

**THE NEW DEPARTURE MFG. COMPANY,
BRISTOL, CONN.**

(When Writing to Advertisers Please Mention The Automobile Journal.)

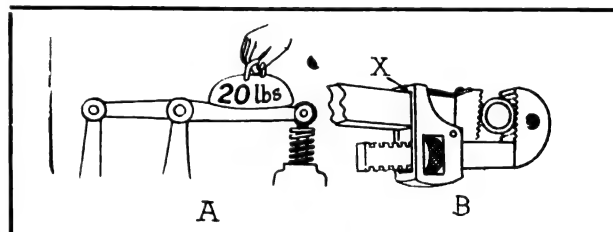
with a screw driver or chisel, after which the surfaces should be cleaned and graphited. Flake graphite is the best lubricant for this purpose and when a small quantity is placed on the leaf it can be applied for the entire surface with a feather. This substance will not work out, but forms a film on the leaves, which insures resiliency by reducing the friction.

TESTING OVERHEAD VALVE SPRINGS.

Overhead valve springs may be tested for strength without removing from the motor, as illustrated. Obtain a weight of about 20 pounds and lightly balance it at end of the rocker arm, over the valve. If the spring is of proper tension, the valve will not be unseated. Of course some springs are stronger than others, but a 20-pound weight as a minimum is not a bad test.

PROPER WAY TO USE A PIPE WRENCH.

A good pipe wrench is a decidedly convenient part of the equipment. Many motorists, how-



A, Testing Tension of Overhead Valve Springs; B, Manner of Setting Pipe Wrench so That It Cannot Crush Article.

ever, do not use this tool on slender pieces which are liable to be crushed. There is a right and wrong method of using this wrench. When used properly it is impossible to crush even the most delicate piece. The wrench should be placed on the article to be moved and subjected to a slight strain until the jaws grip. The adjusting nut should then be slackened off until the bottom of the frame touches the handle at the point marked X in the illustration.

SILENCING NOISY RIMS.

When trucks are equipped with demountable rims one may note an annoying sound at each revolution of a wheel. The noise may cause the motorist to believe that the spokes of the wheel are loose. The trouble is generally to be located in the bolts which retain the rim to the wheel. The wear is usually the result of running with the bolts too loose and the only proper remedy is

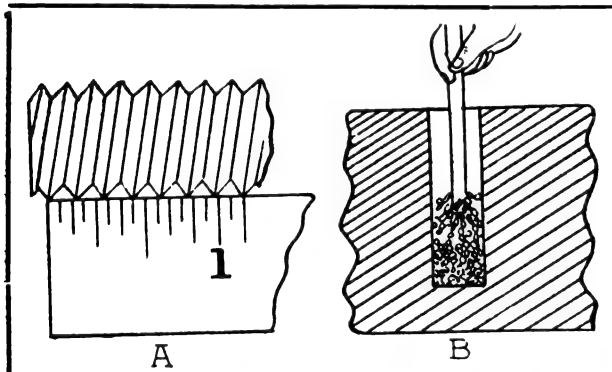
to replace the old bolts with new. A temporary remedy for this trouble, however, may be easily effected by loosening the bolts and inserting a small piece of leather between the wedge and demountable rim, as shown at A.

MEASURING SCREW THREADS.

When determination of the pitch of a screw is necessary and a thread gauge is not to be had a scale may be placed on the screw as illustrated at A. The end of the scale should be opposite the top point of any thread and the spaces counted under the scale between the threads for one inch. If there are eight spaces within the inch, for instance, the screw is eighth-inch pitch, or has eight threads to the inch.

REMOVING METAL CHIPS.

It is frequently found necessary to drill some



A, Handy Method of Determining Thread Pitch with a Rule; B, Removing Metal Chips with a Magnetized Rod.

stationary part of a machine. If the hole is to be used for the entire depth and has not been drilled completely through the part, removing the metal chips may be difficult. Nothing can be found handier for this operation than a small magnetized rod or tool. Simply insert the rod in the hole and when removed some chips will adhere to its surface, as shown at B. A small rod or tool may be easily magnetized by placing on a charged plate.

EMERGENCY FUNNEL.

Frequently when on the road a funnel is necessary to pour a fluid into some part of the machine. In such exigencies the ordinary hand horn will serve as a practical substitute. Simply disconnect the horn and remove the reed, and after cleaning it will serve admirably.

(When Writing to Advertisers Please Mention The Automobile Journal.)

METZ "25"

The Quality Car



1916 MODEL

\$600 Completely Equipped

Including Electric Starter and Electric Lights

DEALERS will find this new METZ model a very attractive and profitable proposition. It has all the refinements and the leading improvements in construction and equipment which distinguish the up-to-date car, is delightfully easy-riding and luxuriously finished. For reliability in road performance it is unsurpassed. Its remarkable hill-climbing ability, simplicity in operation, upkeep economy, and absolute freedom from gear and clutch trouble are strong selling features.

Write us for Dealer particulars and new catalog "Q"

METZ COMPANY, WALTHAM, MASS.

EISEMANN

The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.

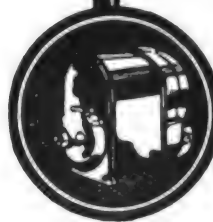
The Eisemann Magneto Company

Sales and General Offices,

32-33d St., Brooklyn, N. Y.

New York, N. Y. Indianapolis, Ind. Detroit, Mich.

123 W. 52nd St. 415 N. Capitol Av. 802 Wd'w'd Av.



Why Pay Excessive Hotel Rates?

THE NEW AMSTERDAM

Euclid Avenue at 22nd Street, CLEVELAND, OHIO

A five minutes walk from the active centres, yet overlooking the most beautiful residence section of Cleveland.

"The logical resting place for tired Tourists."

Large airy suites of from two to five rooms (also single rooms.)

GARAGE NEARBY

RATES:—\$1.50 per day, each person

Dining Room Modified a'la Carte

A. A. McCASLIN, Managing Director

L. McNAMARA, Manager

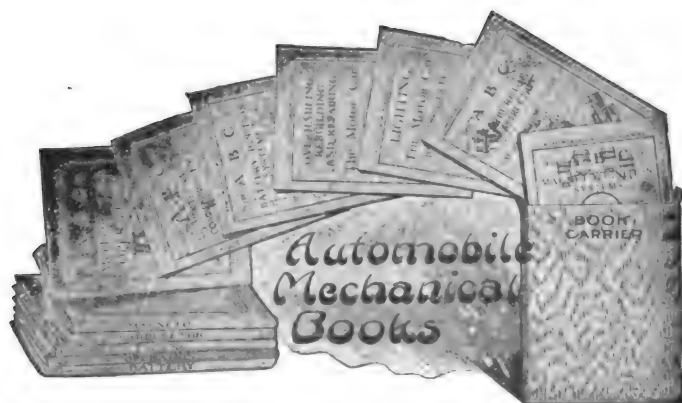
A Complete Library of Automobile Mechanics **\$4.75**

Transportation Charges Prepaid

Distinct Books—1000 Pages of Text—All Copies Indexed—2000 Illustrations, Including Practical Working Page Charts and Trouble Finders.

Books written by recognized authorities. Especially prepared for those who have to do with the sale, care, repair and operation of motor vehicles, their parts, equipment, accessories, etc.

The practical information in these works cannot be secured through any other series or number of books or for 50 times what is charged for this library.



Engine . . .	35c	Chassis . . .	25c
Magneto . . .	35c	Lighting . . .	50c
Carburetor . . .	35c	Operation . . .	50c
Battery . . .	35c	Overhauling . . .	50c
Tires . . .	25c	Motorcycle . . .	35c

Truck Operation \$1.00

Automobile Journal Publishing Company

Times Building

Pawtucket, R. I.



Easy access to the front seats
from the back is afforded by
space between two front seats,
making it possible to reach the
seat beside the driver without
going around the car

Pierce-Arrow

MULTIBESTOS REG. U. S. PAT. OFF.

Asbestos and brass wire---

Yes, these and chemical ingredients handled by a directing knowledge form the basis of all good brake lining.

But there is more than these in MULTIBESTOS. Into its warp and woof are woven the ideals of the organization behind it—honesty, sincerity and right dealing.

Perhaps this accounts for the success and popularity of MULTIBESTOS.

Perhaps it accounts for a volume of business increasing at a rate not equaled by any other brake lining manufacturer.

Standard Woven Fabric Co.

Factory, Framingham, Mass.
New York Branch and Export Office
1779 Broadway

BOSTON—F. Shirley Boyd, 175 Massachusetts Ave.

PHILADELPHIA—N. A. Petry Co., Inc., 1309 Race St.

CHICAGO—F. E. Sparks, 1430 Michigan Blvd.

SAN FRANCISCO—Fred Ward & Son, Inc., Cor. First and Howard Sts.

MULTIBESTOS REG. U. S. PAT. OFF.

**THE NEW YORK PUBLIC LIBRARY
REFERENCE DEPARTMENT**

**This book is under no circumstances to be
taken from the Building**

form 410

B D OCT 20 1915

